March 1945

Chemical Industries

The Chemical Business Magazine

SEARCH MANAGEMENT page 397

Production and Consumption of Insecticides page 406

Explosives Need Alkalies

Explosives are the major destructive agent of bullets, bombs, shells, mortars, grenades, mines, torpedoes. Important factors in the manufacture of this potent force are Solvay Alkalies and their related products . . . another example which proves, in war as in peace, alkalies are indispensable!

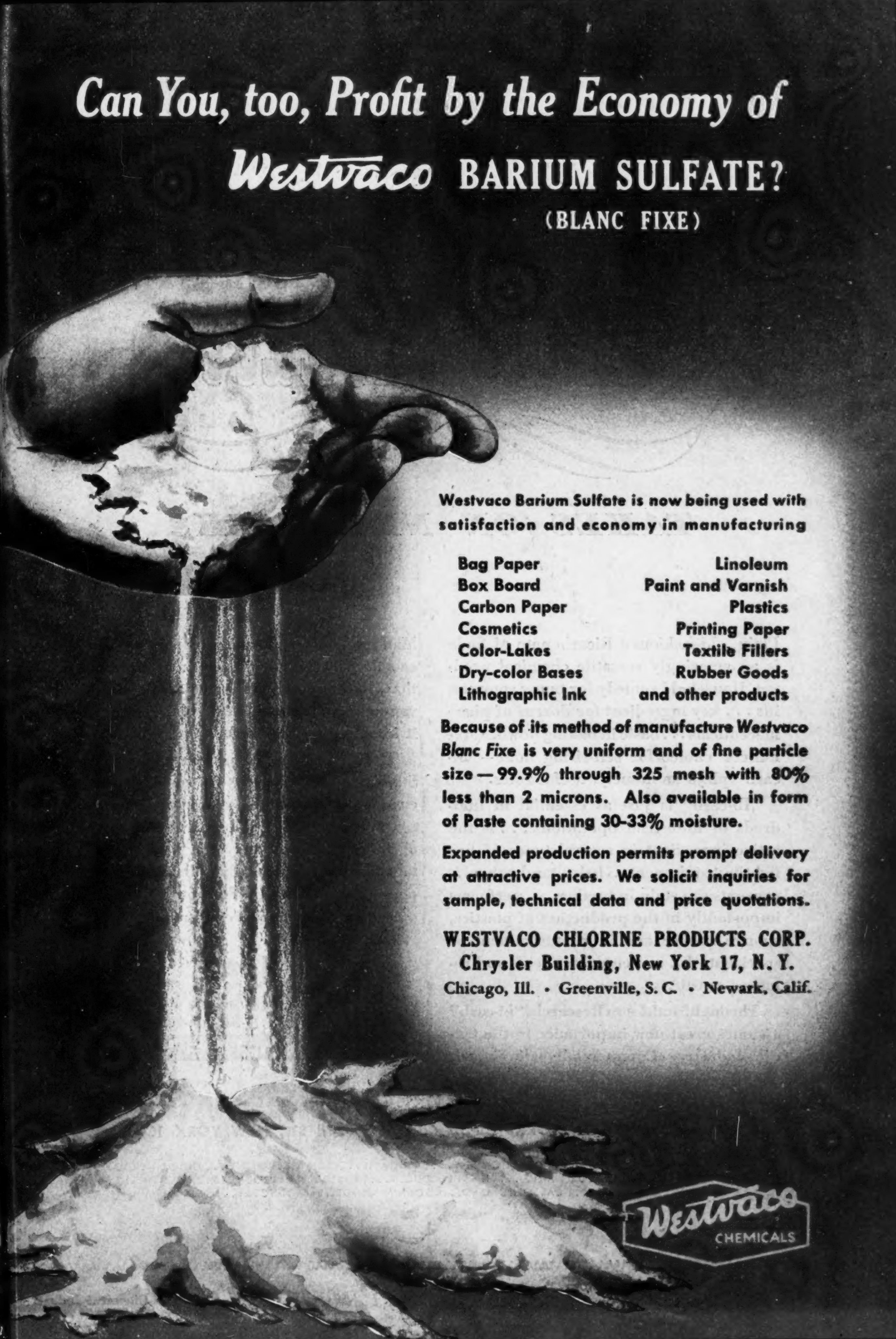
SODA ASH

CAUSTIC SODA

CHLORINE

AMMONIUM CHLORIDE

SOLVAY SALES CORPORATION *Alkalies and Chemical Products Manufactured by The Solvay Process Compan*


Can You, too, Profit by the Economy of
Westvaco BARIUM SULFATE?
(BLANC FIXE)
Westvaco Barium Sulfate is now being used with satisfaction and economy in manufacturing
Bag Paper
Box Board
Carbon Paper
Cosmetics
Color-Lakes
Dry-color Bases
Lithographic Ink
Linoleum
Paint and Varnish
Plastics
Printing Paper
Textile Fillers
Rubber Goods
and other products
Because of its method of manufacture Westvaco Blanc Fixe is very uniform and of fine particle size — 99.9% through 325 mesh with 80% less than 2 microns. Also available in form of Paste containing 30-33% moisture.
Expanded production permits prompt delivery at attractive prices. We solicit inquiries for sample, technical data and price quotations.
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CHEMICALS

Chemical Industries

THE BUSINESS MAGAZINE for MAKERS and USERS of CHEMICALS

Management • Research • Production • Marketing

VOL. 56—NO. 3

March, 1945

Contents

DEPARTMENTS

NEWS OF THE MONTH

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ABP ABC

THE READER WRITES

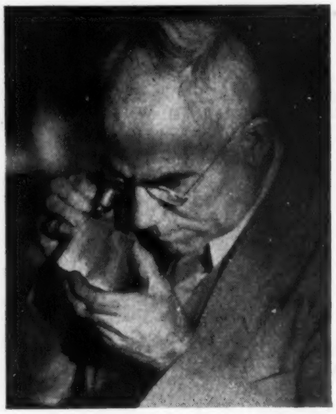
Kremers Magnifier

To the Editor of Chemical Industries:

I am desirous of obtaining information concerning the type of magnifying glass Dr. H. C. Kremers is using in a picture of him which appears in the December issue of CHEMICAL INDUSTRIES. If it is possible for you to give me some information where to obtain a magnifying glass like the one he is using, I would appreciate it very much.

JOHN BRICKER
Blue Ridge Rubber Co.
Taneytown, Md.

For the information of Mr. Bricker and other readers who may be interested in magnifying glasses, Dr. Kremers tells us



that the glass he happens to be using to examine the crystal for flaws (see cut) is a folding pocket magnifier—14x and focal length of ¾ inch—similar to one supplied by Bausch & Lomb. He adds that a very satisfactory magnifier to use is a jeweler's loupe of about 10 magnifications.—EDITORS.

Indole Synthesis

To the Editor of Chemical Industries:

In the January issue of CHEMICAL INDUSTRIES an article was published in which was described a "new" synthesis of indole (page 67).

I would like to bring the following to your attention. The process described as new was previously described in 1886, and references may be seen in the following books: Friedlaender, Vol. 1, p. 150, Nov. 1886; also Beilstein, Vol. 20, p. 305; "The Preparation of Indole," by Nencki and Berlinerblau, German Pat. 40889.

S. M. TRISTER
Otto B. May, Inc.
Newark, N. J.

We are indebted to Mr. Trister for pointing out that the synthesis of indole described in our January issue is hardly new. We confess that the fault is ours for interpreting wrongly the author's words: "The writer . . . got best results by using a method not discussed in the above reference." (The Givaudanian)

It is noteworthy, however, that the described method is given only a line in Beilstein—and that not under "Preparation," where one would naturally turn for a practical synthesis, but under "Chemical Modes of Formation." It might still be said that it is "new," then, in the sense that it has been found practicable.—EDITORS.

Fats and Oils Production

To the Editor of Chemical Industries:

In connection with your recent article giving the outlook for oils in the United States, I did not see any statistics on the amounts of fats and oils.

Perhaps the enclosed table may be of some use to your readers as it indicates the quantities produced since 1942.

ROBERT S. ARIES
The Polytechnic Institute of Brooklyn
Brooklyn, N. Y.

See table below.—EDITORS.

Production of Fats and Oils from Domestic Materials
(Million pounds)

	Year beginning	1942-43	1943-44	Estimated 1944-45
Animal and fish:				
Butter (including farm)	October	2,082	1,850	1,800
Lard (including farm)	do	2,860	3,460	2,700
Edible tallow, oleo stock, oleo stearin and oleo oil	do	272	213	200
Inedible tallow and grease	do	1,626	1,928	1,800
Wool grease, neat's-foot oil, etc.	do	18	19	18
Marine animal oil	July	165	172	165
Total		7,023	7,642	6,683
Vegetable oils:				
Corn	October	240	214	225
Cottonseed	August	1,410	1,236	1,350
Linseed	July	729	724	(1)560
Olive	November	10	7	6
Peanut	September	131	131	130
Soybean	October	1,206	1,219	1,200
Tung	December	5	2	10
Total		3,722	3,533	3,481
Grand total		10,745	11,175	10,164

(1) Figure includes oil from above normal proportion of unusually heavy flaxseed crops carried over on Aug. 1, 1944. Production from other oilseeds carried over is not included for 1944-45.
Source: 1942-43, 1943-44—Bureau of the Census, Department of Commerce, except butter and lard, Department of Agriculture. 1944-45—Estimate—Fats and Oils Unit, Bureau of Foreign and Domestic Commerce, Department of Commerce.


1845
1945

Trade-Marked Surpluses • Contract Settlement • Chemical Price Indexes Subsidy Extensions • Disposal of Mg and Al Plant

War Plant Expansion

A CONSIDERABLE PORTION OF THE NEW critical production plant program apparently will not be ready until late in the year. Army and Navy appear to be planning for every conceivable need, without any regard for a possible end of the war, and with the sole purpose of having enough of every requirement even if the war lasts for years.

Regardless of the fate of the May "work-or-fight" legislation, the size of projected plant outlays has raised a question as to where the operating manpower is coming from. It is pointed out that even current facilities are driven to extremes to find workers.

Much of this expansion is in synthetic rubber and tire production, a situation that is pointed up by the recent announcement of the international "Rubber Study Group" to the effect that synthetic and natural rubber supplies in sight after the war are approximately double the estimated world consumption.

Protection of Trade-Marked Surplus Goods

ONE ASPECT OF THE DISPOSAL OF SURPLUS Government-owned property has received attention so far only from within some of the industries or trades concerned: the protection of trade-marks or brands.

The trend of thinking in some of the agencies handling these materials and goods is that the Government is under no obligation to resell trade-marked and branded items to the original manufacturer. This has been the practice for a long time, even from prewar days. However, legal aides in certain surplus agencies have raised a question as to whether the practice is either necessary, or as one of them said, "even justified."

"These branded or trade-marked goods were sold to the services without any conditions attached either as to price maintenance, or as to any other restriction on re-sale," one such official observed. "They have been used by the services and are being sold as surplus, as used or second-hand goods. They are being sold 'as is.' If they were private purchases that had taken the same course, the second or third, or the seventeenth user would owe no obligation whatever to the original manufacturer in connection with re-use or re-sale terms.

Whether they are trade-marked, patented or branded, they become the property of the subsequent purchaser without any conditions attached. Why the Government, in the same position, should be deemed to owe any duty to resell to the owner of the trade-mark, the brand, or the patent, is difficult to understand."

Certain so-called Fair Trade laws would seem to be involved here, under which nationally sold goods or manufacture of various kinds, get price protection. However, the problem is only beginning to be realized.

Contract Settlement Report

A PHENOMENON OF PRESENT CONDITIONS is noted in the report of Robert H. Hinckley, director of the Office of Contract Settlement. Firms are actually foregoing many advantages, even financial gains, in their anxiety to terminate their contractual relations with the Government and get on with their affairs.

"Because of renegotiation, high taxes, and the continued high level of war production, contractors are frequently willing to settle terminated contracts either without any claim at all, or without insisting on the costs or profits to which the Act would entitle them," Director Hinckley reported to Congress.

"In 133 out of more than 500 actual cases reviewed, contractors neither claimed nor were allowed profit; in 366 where profit was allowed, it averaged 5.3 percent."

He stated that a high proportion of all contract settlements to date have been made without any claim by the contractor. Two explanations were advanced: the ability to divert to other work without loss, the materials in process for the termination contract, and secondly, the Renegotiation Act.

While the war production level remains high, in Mr. Hinckley's opinion, the first factor will continue to be of great importance. As to the second, it is evident that when contractors have already realized renegotiable profits for the fiscal period, the collection of a claim on a terminated contract amounts merely to a needless exchange of dollars. Any money which is collected from the Government on the settlement of a claim serves merely to swell the amount which will be returned to it in the refund incident to re-

negotiation. It has been simpler merely to waive the claim against the Government.

Drug Price Index Halved After Labor Bureau Revision

MENTION WAS MADE HERE SOMETIME AGO of the swollen price index carried by the Bureau of Labor Statistics for drugs and pharmaceuticals, largely as a result of over-emphasizing ethyl alcohol in the index.

Through the efforts of the Manufacturing Chemists Association, the Bureau has now revised its wholesale price indexes for drugs, pharmaceuticals, chemicals and allied products, in order to reflect the Federal tax and rebate on nonbeverage undenatured ethyl alcohol, and the amounts consumed by the drug industry.

A large and increasing proportion of industrial users of nonbeverage alcohol has been receiving a rebate from the Treasury on purchases of such alcohol. The current tax per gallon on ethyl alcohol at 190 proof is $17.10, against which the current drawback is $11.40.

The effect of the revision, to incorporate this and certain other factors, is shown in the latest figures compared to those first issued: the December 1944 index (1926 equals 100) before revision showed drugs and pharmaceuticals at 217.2, and after revision, 106.9; chemicals and allied products, before revision, 104.8, after revision, 94.8.

Extension of Subsidies on Strategic Minerals and Materials

THE BILL S. 502 (Senator McFarland) was introduced February 8, to provide for continued payment of certain subsidies on strategic metals, minerals, petroleum and petroleum products.

Under the Emergency Price Control Act, as amended in the last session extending this Act, no subsidies may be paid except out of a specific appropriation of Congress. The pending bill would exempt subsidy payments on strategic minerals and metals, on the ground that excessive costs of domestic production make such assistance necessary.

Domestic Purchases of Strategic Materials Defended

THE ARMY AND NAVY MUNITIONS BOARD proposal to stockpile metals and minerals for strategic use from other than domestic sources to a larger extent has struck a snag in Congress.

The plan was advanced in a confidential report of the Board, which, nevertheless, attained a limited circulation among interested members of Congress. A major recommendation was that all domestic preference in regard to strategic purchases of metals and minerals be relaxed. One argument apparently advanced in support of the recommendation was that purchases abroad would ease the pressure on decreasing reserves at home.

Western members of Congress in particular, protested immediately. Senator Scrugham, of Nevada, declared that he could not see why it would be unduly restrictive to require that strategic and critical materials continue to be bought from domestic sources as far as practicable.

They are prepared to insist that domestic producers continue to be favored in service buying for future emergencies. Furthermore, they are now pressing for publication of the hitherto confidential report, on the ground that it is needlessly secretive, and should be given to the public as an index of the scope of the purchase plan.

Disposal of Magnesium and Aluminum Plants to Be Studied

SENATE HEARINGS WHICH WERE SCHEDULED to begin around the end of February will seek information as to the best postwar use to be made of Government-owned surplus magnesium and aluminum facilities. The intimation is strong that some form of public operation would be welcomed by the interested committee members.

Prominent industry figures in the fields will be asked to give their opinions, among them R. S. Reynolds, president of Reynolds Metals; Willard H. Dow, president, Dow Chemical Company; Henry Kaiser, president, Kaiser Company, Inc., and many others.

Representatives also will testify from Defense Plant Corporation, War Production Board, State Department, Bureau of Mines, Department of Justice.

TVA Fund Control Up Again

THE FIGHT IN CONGRESS to bring TVA under direct financial control of that body has been renewed with introduction by Senator McKellar of his bill, S. 464, to require TVA to turn over its receipts to the Treasury, to restrict TVA's authority to condemn property, and tighten otherwise the financial controls now exercised by TVA in a semi-autonomous manner.

Incidentally, under the heading "Mineral Fertilizers and the Nation's Security" the Board of Directors of TVA have made a number of recommendations, of which several are:

"Greatly increased use of mineral fertilizers, particularly phosphates, is essential to the future security of the American people. The Nation's soils need two to three times more phosphate than the Nation now produces;

"To supply the major part of the Nation's requirements there is urgent need for private industry to increase greatly its capacity to produce phosphatic fertilizer;

"Farmer ownership and operation of a portion of the Nation's fertilizer manufacturing capacity is needed to assure an adequate national supply;

"Government ownership and operation of a portion of the Nation's fertilizer capacity for the conduct of a practical plant-scale research and development program is likewise essential.

Source of "Firsts"

Modern Research Laboratory at Niagara Plant as interpreted by the artist, John Gaydos

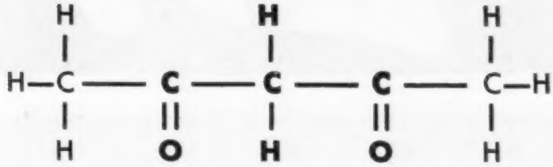
THE FACT that Niagara was the first to produce several important electro-chemical products in this country is due in great part to the efficiency of its research. Niagara's research activities are under the supervision of men of long and thorough experience in electro-chemical development, manufacture, and usage. This has enabled Niagara to give valuable cooperation to many industries using such products in the processing of war materials. It will prove of equal value in helping these industries convert efficiently to peacetime manufacture. Look to Niagara for experienced chemical service.

Niagara ALKALI COMPANY

60 EAST 42nd STREET, NEW YORK 17, N. Y.

A New Industrial Chemical for Organic Synthesis

Pentanedione

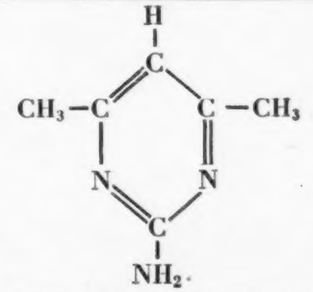


(Acetyl Acetone)

Pentanedione, a clear colorless liquid, is an extremely reactive chemical. Since it is a 1,3-diketone with an active methylene group, it has three points of reactivity. Pentanedione can be employed as an intermediate in the preparation of a wide variety of compounds. Two interesting examples are shown here:

1. Preparation of substituted pyrimidines.

$$\underset{\text{Pentanedione}}{CH_3-\underset{\underset{O}{\|}}{C}-CH_2-\underset{\underset{O}{\|}}{C}-CH_3} + \underset{\text{Guanidine}}{\begin{matrix} NH_2 \\ NH_2 \end{matrix} \rangle C{=}NH} \longrightarrow$$



2-Amino-4,6-dimethyl Pyrimidine

This pyrimidine is an intermediate in the preparation of sulfamethazine.

2. Formation of metallo-organic compounds.

$$2\,\underset{\text{Pentanedione}}{CH_3-\underset{\underset{O}{\|}}{C}-CH_2-\underset{\underset{O}{\|}}{C}-CH_3} + CuCl_2 \longrightarrow \underset{\text{Copper Salt of Pentanedione}}{Cu\begin{cases} OC(CH_3)=CHCOCH_3 \\ OC(CH_3)=CHCOCH_3 \end{cases}} + 2HCl$$

With many metals Pentanedione forms stable metal salts which are oil-soluble. Certain of these salts are distillable and may be useful in the purification of the rarer metals.

Pentanedione can also be used in the synthesis of quinaldine derivates for dyestuffs. With aniline, Pentanedione yields 4-methyl quinaldine, which is useful in preparing cyanine dyes.

Pentanedione condenses with diazonium compounds to make colors similar to the Hansa yellow colors. It will also condense with a number of other materials, such as hydroxylamine to give 3,5-dimethyl isoxazole, and with phenyl hydrazine to yield 1-phenyl-3,5-dimethyl pyrazole. It can be hydrogenated to 2,4-pentanediol.

For the physical properties of Pentanedione and further information about it, write for our technical information sheet.

BUY UNITED STATES WAR BONDS AND STAMPS

SYNTHETIC ORGANIC CHEMICALS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

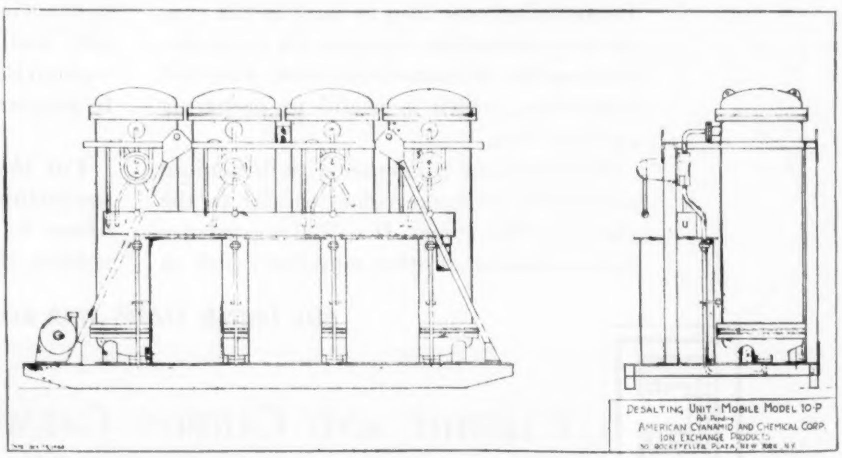
30 East 42nd Street, New York 17, N. Y.

LIFE On The

(Above) **PORTABLE FILT-R-STIL ASSEMBLY** for use, for instance, in the petroleum field can be mounted on skids, moved by truck, or permanently installed.

FILT-R-STIL PRODUCES 10 GALLONS OF MINERAL-FREE WATER A MINUTE

A new, economical way of producing the chemical equivalent of distilled water on location is now available with the FILT-R-STIL industrial unit. Brackish water containing up to 4,000 ppm, or even higher, of dissolved salts, is transformed into demineralized water with an average ionizable solids content as low as two ppm as calcium carbonate by means of a "filtration" process employing Ion Exchange Resins. The FILT-R-STIL, developed by Cyanamid's Stamford Laboratories, is produced in several sizes and capacities to meet specific requirements.

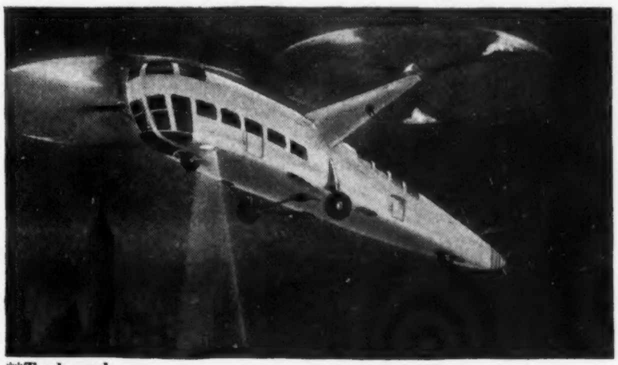


(Above) **FILT-R-STIL UNITS** of different sizes for varied water demineralizing requirements consist of four treating towers containing beds of Ion Exchange Resins. Raw water is fed under pressure and demineralized water delivered through a conductivity cell. Units, such as above, are equipped with a regenerative system for the reactivation of the Ionac resins.

Chemical Newsfront

(*Above*) **FOR PROTECTION AGAINST ARCTIC SNOW AND JUNGLE RAINS,** extreme conditions met by the armed forces, water repellent finishes are now being given to fabrics for outer wear with Cyanamid's PARAMUL**115. It pregnates fibers with wax without any stiffening effects, is easy and economical to apply and is now available for general textile processing use.

(*Below*) **TWO-ROTOR HELI-BUS** for intercity travel . . . another "potential" in the field of new design developments where new, improved protective surface coatings for which Cyanamid resins, now being used for war essential finishes, will be in demand.



***Trade-mark*

(*Above*) **DISTRIBUTOR PARTS** made of Cyanamid's MELMAC* plastic add to the life and efficiency of commercial type magnetos for tractors, combines, and heavy-duty machinery because of their high heat resistance, non-inflammability, and resistance to arc tracking.

**Reg. U. S. Pat. Off.*

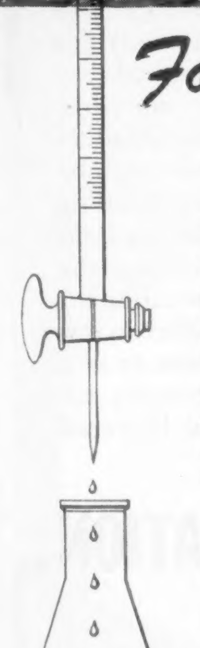
American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA . NEW YORK 20, N. Y.

Foods-Medicines-Ammunition-Supplies

. . . ALL REQUIRE MEASURED PURITY!



They are unloading war supplies in the Pacific. Precious cargo this. And the quality of practically every piece unloaded had to have an O.K. from the chemist.

FOODS frequently had to be fortified. Nutrient values had to be safeguarded. Fighting men had to be kept strong, healthy, and fit. The food chemist with one of his dependable allies, Baker's Analyzed C.P. Reagents, helped make this possible.

DRUGS—SERUMS—MEDICINES. Huge quantities were needed. Infection had to be prevented or arrested. War casualties had to be reduced—lives saved. The chemists of many drug and pharmaceutical laboratories use Baker's measured purity two ways—Baker's Analyzed C.P. Reagents to test and control quality—Baker's fine chemicals as ingredients in the products themselves.

AMMUNITION AND SUPPLIES. You know the answer here. Behind the active hands of war industry the chemist controlled the quality whether the product was ammunition, guns, jeeps, airplanes, ships, or communication systems. And back of the chemist's decisions was his reliance on his laboratory reagents.

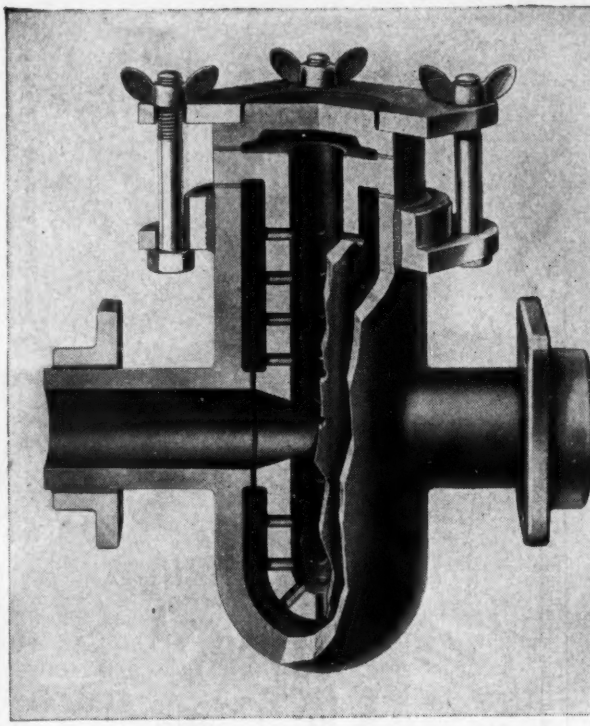
If you have special chemical requirements for war production or in anticipation of post-war needs—if you require measured purity to predetermined standards, we invite you to discuss your problem in confidence with Baker. We may be able to help you, for Baker Chemicals are kept abreast of industry's exacting needs.

J. T. Baker Chemical Co., ***Executive Offices and Plant:*** **Phillipsburg, New Jersey.** ***Branch Offices:*** **New York, Philadelphia and Chicago.**

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

PRESCRIPTION
FOR
PROCESSING



CHEMICAL STONEWARE PIPE LINE STRAINERS PROTECT YOUR PUMPS

PIPE LINES are the arteries of a chemical plant and pumps are the hearts that keep the vital fluids circulating. What is more important then, than safeguards for pumping equipment? Engineering departments give too much thought to the selection of a pump to have it ruined in a few seconds by a bolt or pebble dropped in a feed tank by a careless workman. This is especially important in the case of pumps constructed for withstanding the most rigorous corrosive conditions.

Realizing the need for a safeguard for chemical stoneware and other acid resisting pumps General Ceramics has designed and is manufacturing the strainer illustrated on this page.

The flow of liquid through the perforated stoneware basket prevents injurious materials from reaching the pump interior. The inside of the strainer is machined to close tolerances minimizing loss of suction head. The cover is held to the body by wing bolts allowing the strainer to be cleaned and placed back on stream in a few minutes. The inlet and outlet are provided with Meehanite flanges with A.S.A. standard drilling so that the strainer can be placed in any type of pipe line without the use of special adapters. Standard stoneware conical flanges can be provided if desired. Strainers are available in sizes from 1″ to 8″ inside diameter. Other sizes can be furnished on order.

Following our policy of supplying completely engineered corrosion resisting equipment the strainer is delivered ready for operation with all metal parts supplied.

This piece of apparatus is only one illustration of the efforts of the General Ceramics engineering department to reduce maintenance and speed operation in plants handling corrosive chemicals. If you are having difficulties with any problem involving the handling of corrosives we have a solution for you. The answer will be found either in our large supply of standard equipment or in a piece of chemical stoneware apparatus tailormade to fit your installation and delivered to you ready for operation.

GENERAL CERAMICS AND STEATITE CORPORATION

CHEMICAL EQUIPMENT DIVISION

KEASBEY, NEW JERSEY

Buffalo: 610 Jackson Building • Chicago: 20 N. Wacker Drive • Los Angeles: 415 So. Central Avenue • New York: 30 Broad Street
Portland: 3019 N. E. 26th Ave. • San Francisco: 598 Monadnock Bldg. • Seattle: 1411 Fourth Ave. • Spokane: 3219 Wellington Pl.
Tacoma: 702 Tacoma Bldg. • Montreal: Canada Cement Bldg. • Toronto: Richardson Agencies, Ltd., 454 King St. West
Vancouver, B. C.: Willard Equipment Ltd., 860 Beach Ave.

GENERAL CERAMICS and STEATITE CORPORATION
Keasbey, N. J.
High Frequency Insulation for the Electronic Industries

CARILLON CERAMICS CORPORATION
Metuchen, N. J.
Domestic and Institutional Sanitary Ware

Manufacturing facilities of General Ceramics and Steatite Corporation and their affiliates are available for handling ceramic products in all branches of industry. General Ceramics and Steatite Corporation are thus able to offer a service covering all industrial applications of ceramic products.

723

MODERN DEVELOPMENTS OF GASKET RESEARCH

SPIRALWOUND . . .

Type 4-Y

This Metal-Asbestos "Sandwich"

Makes Sealing Warped and Pitted Flanges A *PICNIC*

SPIRALWOUND — an extremely popular gasket for standard or special flanges and boiler tube caps, hand-holes or man-holes — is composed of interlocking plies of preformed metal, cushioned with Asbestos strip, spirally-wound together.

Under compression, the central spring-like corrugation of the metal strip enables the gasket to seal warped or irregular flange faces and provides unequalled resilience to compensate for expansion and contraction in service. In addition to the multiple-sealing action of this metal strip, the Asbestos cushion also fills irregularities in flange faces to assure a tight closure.

SPIRALWOUND Gaskets have great mechanical strength, are highly resistant to corrosion and temperature extremes, have proper compressibility with relatively light bolting. Rugged construction permits re-use a number of times when seals must be broken.

This better gasket is another example of modern Gasket Engineering. To keep you posted on the latest gasket developments, we will be glad to send you a series of technical bulletins containing original data resulting from continuous research in the unique Goetze Laboratory. Please write on your company letterhead, mentioning your position.

LOWELL THOMAS Speaks on New Gasket Film

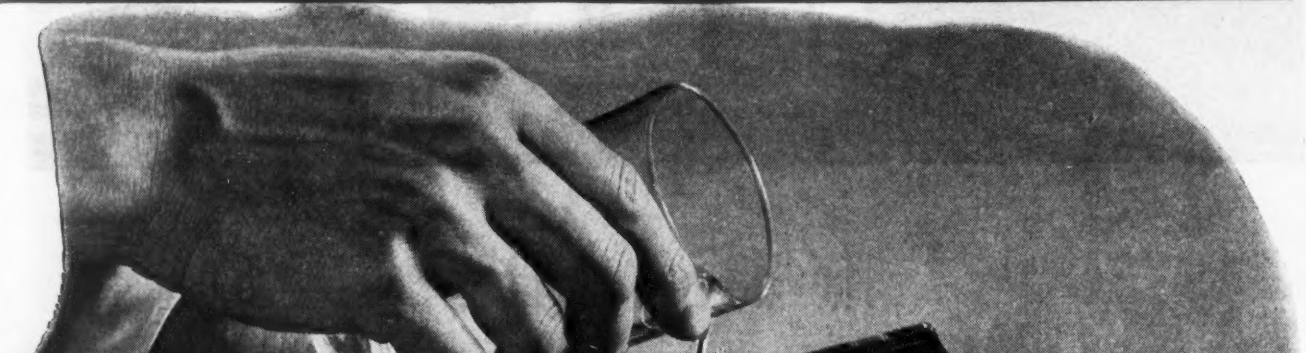
Now available to employee groups, technical societies, engineering schools and other organizations throughout the country, this new 35-minute Kodachrome film, "Only a Gasket," tells why these are the "Biggest little things" in modern Industry. Write for full information.

GOETZE GASKET & PACKING CO., INC.
36 ALLEN AVENUE, NEW BRUNSWICK, NEW JERSEY

Goetze for GASKETS

"America's Oldest and Largest Industrial Gasket Manufacturer"

Celanese* Chemicals



Water-repellency is only one quality Lindol contributes to emulsions used as plasticizers for coating papers and fabrics. Better dispersion of pigments, better color values—non-flammability—toughness and flexibility—are other advantages of these stable Lindol compounds.

CELANESE CORPORATION OF AMERICA

Precision and diversification typify research in synthetics

INDUSTRY, ever more concerned with advanced chemical processes, naturally turns to synthetics. For synthetics, by their very nature, can be more accurately tailored to individualized needs.

In exactly meeting these modern demands, Celanese research has produced precision results in widely diversified fields. For example, Celanese organic phosphate emulsions serve both in oil-in-water and water-in-oil processes to meet the demands of varied applications.

These stable compounds provide the key to many difficult situations. For instance, plasticizing water-soluble type plastics and water-soluble coating materials for paper and fabric, such as book and shade cloths. In addition to providing an improved plasticizer, these emulsions add the quality of water repellency—plus increased color value of pigments.

In common with the Lindol* group of organic phosphates, these emulsions also contribute high film strength and excellent lubricating characteristics. Consider their possibilities, too, as lubricants and coolants for wire drawing operations. They are non-corrosive, have high film strength lubricating characteristics, are fluxes for subsequent tinning operations and plasticizers for enamel coatings. This is the kind of *extra* performance which characterizes Celanese chemicals in the minds of engineers through such diversified products as Lindol, Lindol* E.P., Lindol* M.P., Celluflex* and Cellulube*.

Each is a specialized product, yet each has many specialized uses, often vital roles in industry and war. Lindol E.P., as a lubricant additive in oils for warplane engines, increases film strength to withstand long periods of terrific heat and acts to dissolve resinous deposits.

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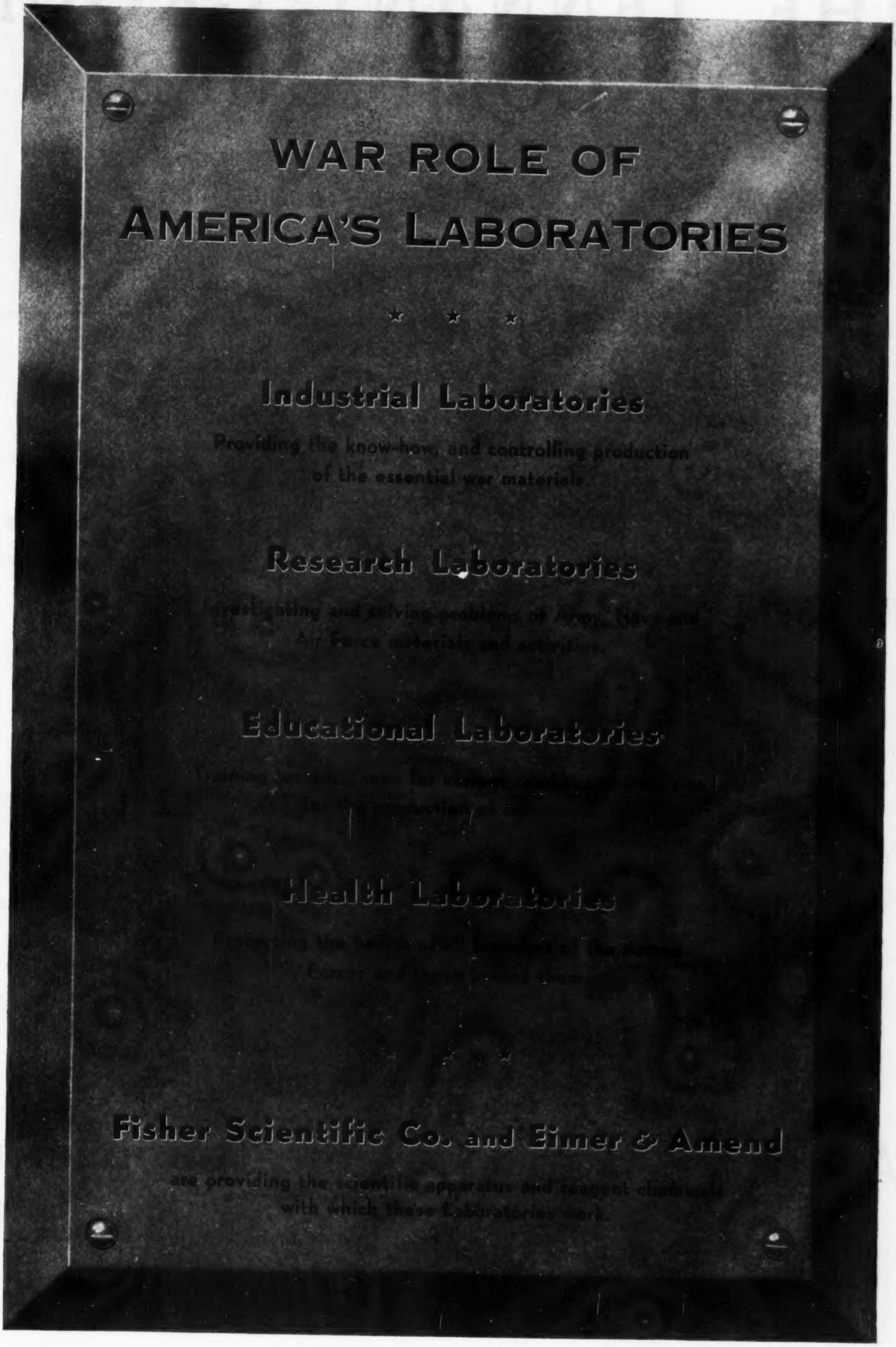
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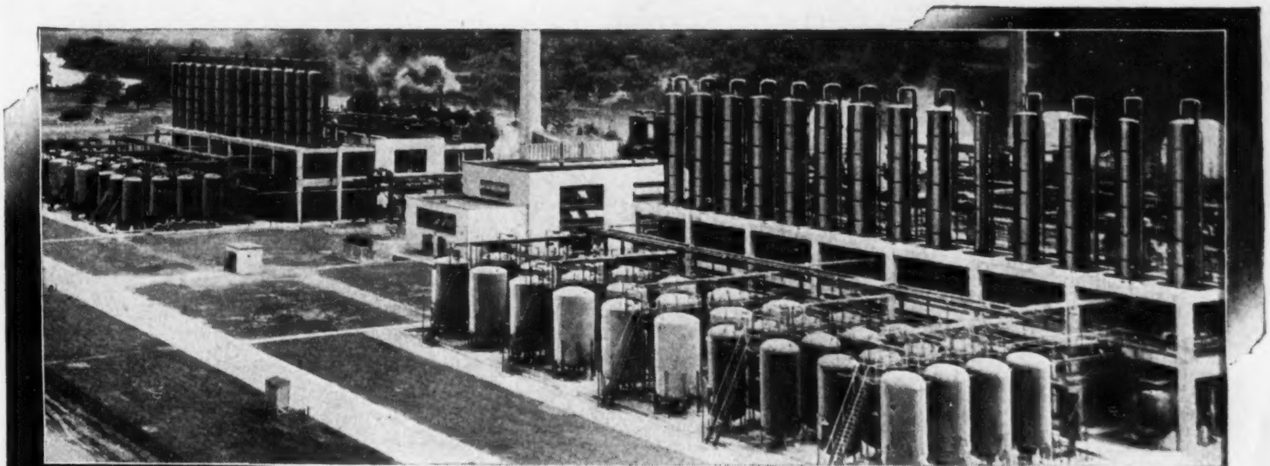

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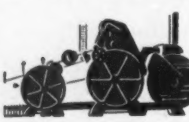

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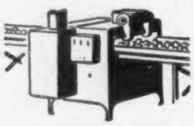

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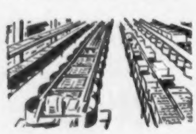

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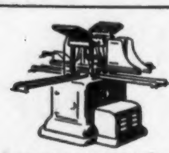

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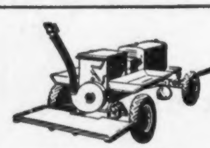

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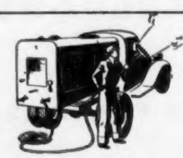

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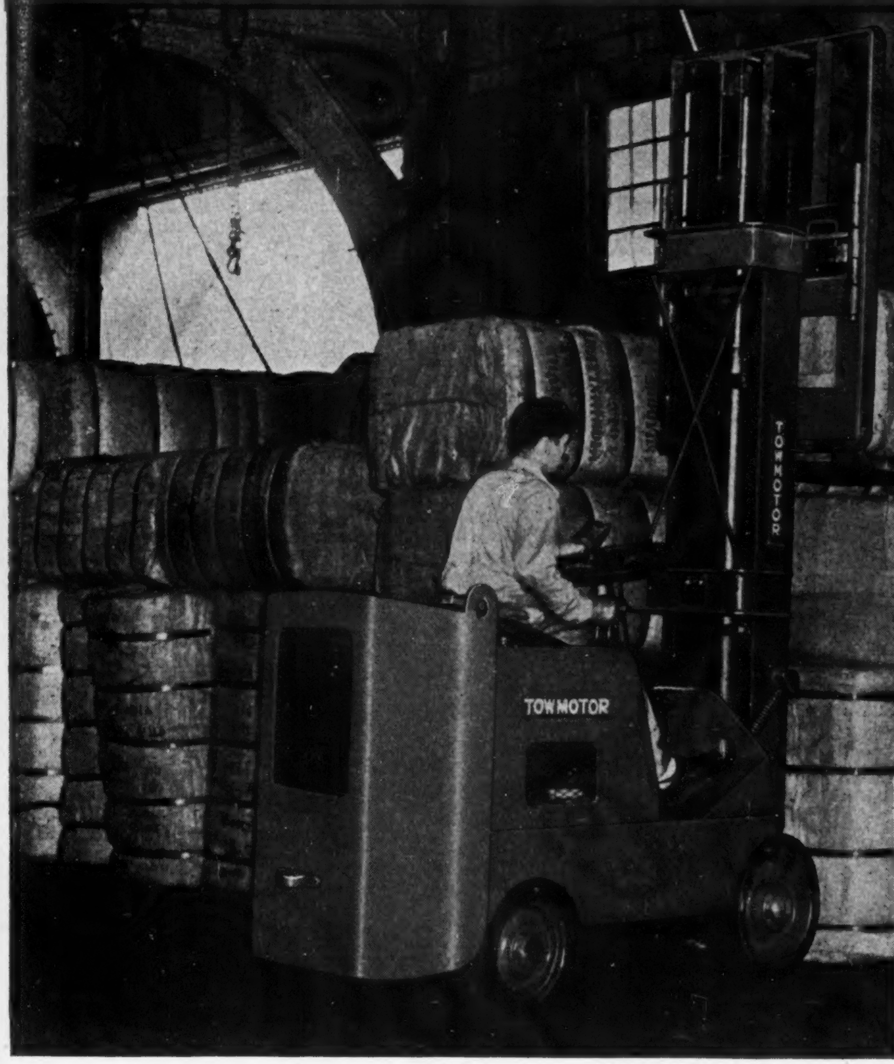

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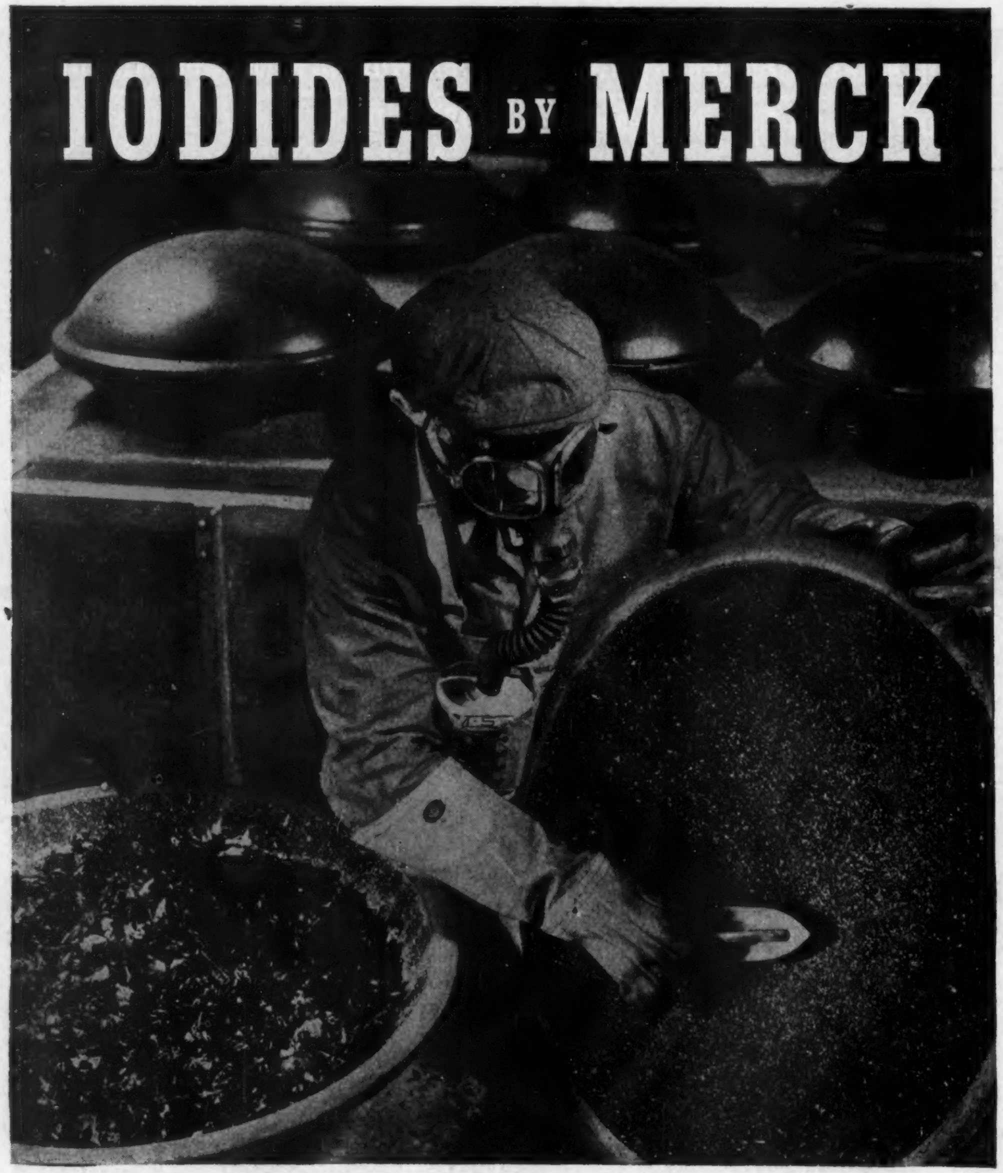

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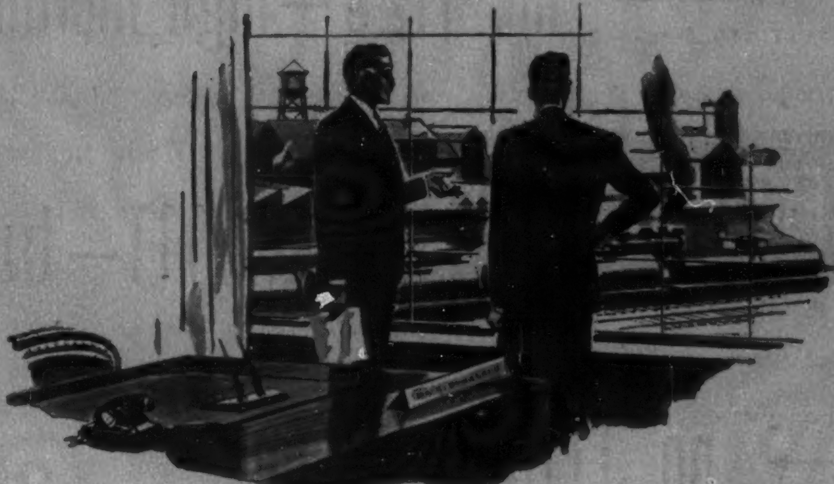

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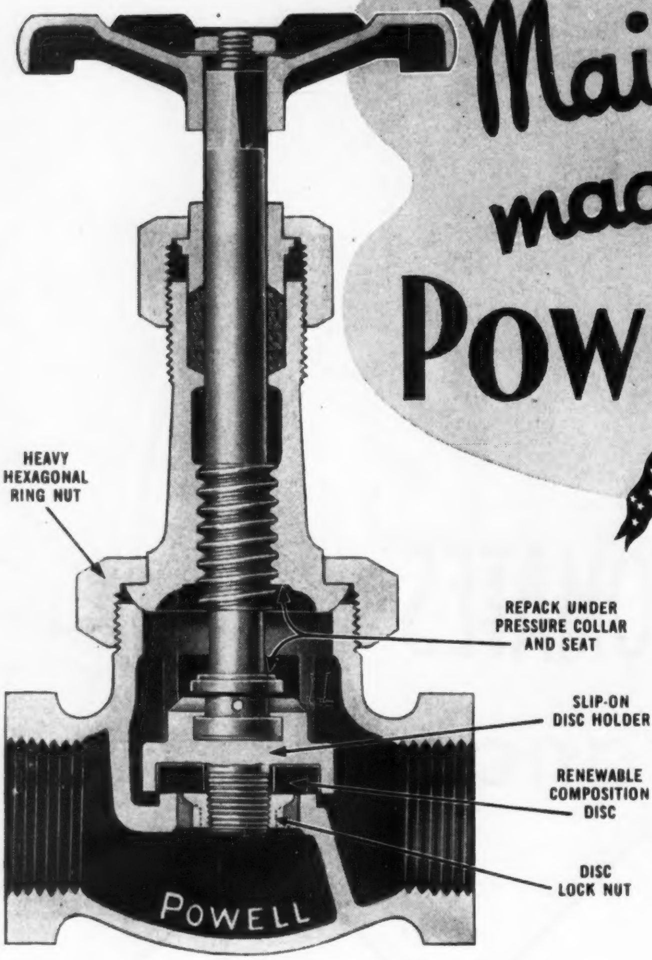

Fig. 150
BRONZE "UNION" COMPOSITION DISC GLOBE VALVE

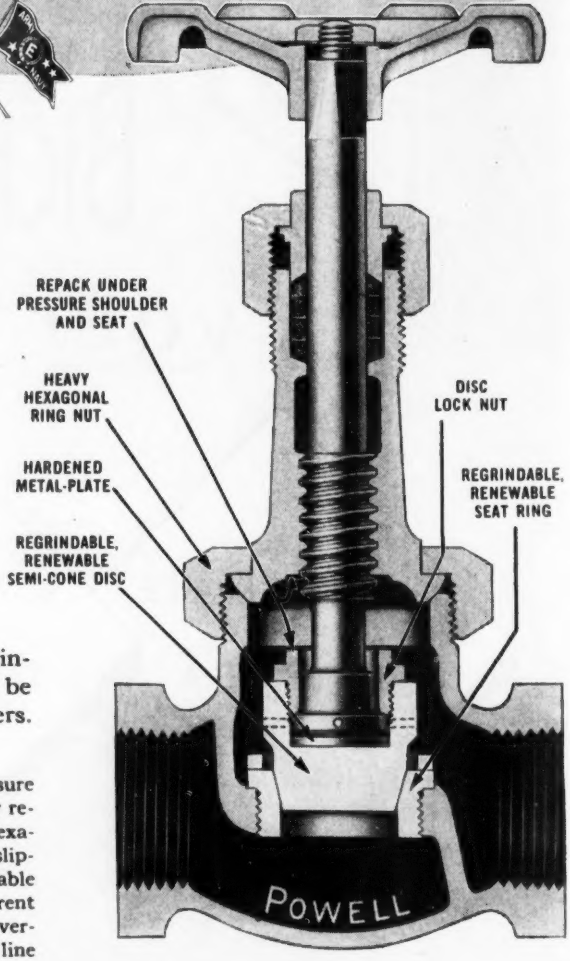

Fig. 1708
BRONZE "WHITE STAR" GLOBE VALVE

In these days of round-the-clock operation, time spent in the maintenance of equipment means a loss in production that can never be made up. If it's flow control equipment, Powell has the answers. Here are two examples.

Fig. 150—a Union Disc Globe Valve—is an economical valve for low pressure steam, oil, water, gas or air. The composition disc can be quickly and easily replaced without removing the valve from the line merely by backing off the hexagonal ring nut, lifting the bonnet assembly out of the body and removing the slip-on disc holder. The discs, especially for the smaller sizes, are readily obtainable and very inexpensive. Discs of various compositions are available to meet different service conditions and the importance of using the *right* disc cannot be overemphasized. The seat can be refaced without removing the valve from the line as indicated above.

For *extra long life,* Fig. 1708 is recommended. The seat ring and disc are made from special hard metal compositions. The hardness of the seat and disc, with their wide contact surface, tends to resist erosion and corrosion over a long period of time. Without removing the valve from the line, seats and discs can be reground to a new tight bearing and, when necessary, new ones can be easily installed. No special tools are required.

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HOOKER CATALYSTS

Aluminum Chloride, Anhydrous, $AlCl_3$

Molecular Wt.	133.3
Solubility: Gms/100 gms	
Nitrobenzene	26.6 at 20°C
Orthochlornitrobenzene	22.6 at 20°C
Heat of solution	550 small calories/gram minimum

DESCRIPTION: Gray crystalline solid.

ANALYSIS: Aluminum Chloride	99% Min.
Iron	0.1% Max.

USES: As a catalyst for Friedel-Crafts reactions; polymerization, isomerization, halogenation in petroleum and rubber industry. Also used in dye making, photographic chemicals and pharmaceuticals.

Antimony Trichloride, Anhydrous, $SbCl_3$

Molecular Wt.	228.1
Melting Point °C	73.4
Solubility: Gms/100 gms	
Benzene	30.5 at 20°C
Monochlorbenzene	56 at 20°C

DESCRIPTION: Yellowish solid.

ANALYSIS: Antimony Trichloride	99% Min.
Iron and Arsenic	1% Max.
Lead	0%

USES: As catalysts in manufacture of dyes, pharmaceuticals; intermediate in manufacture of antimony salts; a mordant in textile printing; moisture and fireproofing textiles.

HOOKER INTERMEDIATES

Benzoyl Chloride, (Benzenecarbonyl Chloride), C_6H_5COCl

Molecular Wt.	140.5
Min. Freezing Point °C	-0.9

DESCRIPTION: Water clear liquid. Soluble in ether, reacts with alcohol and water.

USES: Highly active source of benzoyl group; manufacture of benzoyl peroxide, benzophenone, benzyl benzoates, other esters and ketones.

Other Hooker Benzoyl intermediates include *Benzoic Acid* and *Benzoate of Soda*.

HOOKER SOLVENTS

Monochlortoluene (Methyl Chlorbenzene), $C_6H_4ClCH_3$

Molecular Wt.	126.5
Boiling Range °C	158 to 163
Solubility: Water	Insoluble
Ether	Infinitely soluble

DESCRIPTION: Colorless liquid, consisting of approximately 60% orthochlortoluene and 40% parachlortoluene.

USES: Solvent for rubber and synthetic resins; manufacture of rubber chemicals; intermediate for other organic chemicals.

Orthodichlorbenzene (1:2 Dichlorbenzene), $C_6H_4Cl_2$ (Tech)

Molecular Wt.	147
Boiling Range °C	170 to 180
Freezing Point °C	-10
Solubility: Water	Insoluble
Alcohol	Infinitely soluble
Ether	Infinitely soluble

USES

1. Solvent for: natural and synthetic gums, resins, tars, rubbers, greases, oils, fats, asphalts, sulfur.
2. Insecticide for: termites, powder post beetles, flies, bedbugs, roaches, wood borers, midges, barnacles, etc.
3. Ingredient of: metal polishes, paint and varnish removers, tar removers.
4. Manufacturer of: pyrocatechin, dye intermediates, other synthetic organic chemicals.
5. Degreasing: metals, leather, hides, wool.

Further information on Hooker Chemicals will be furnished gladly. If you are looking for a chemical to solve a particular problem, perhaps our technical staff can help you find it among Hooker's many other products.

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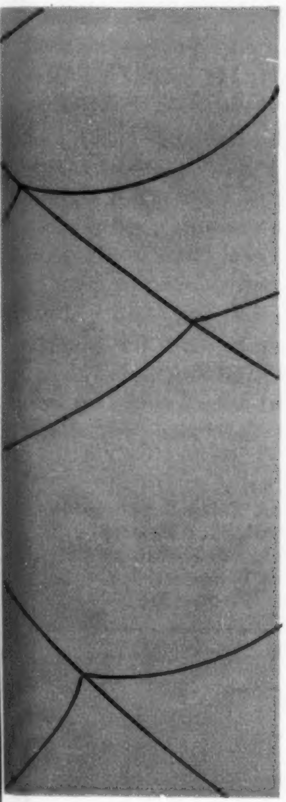

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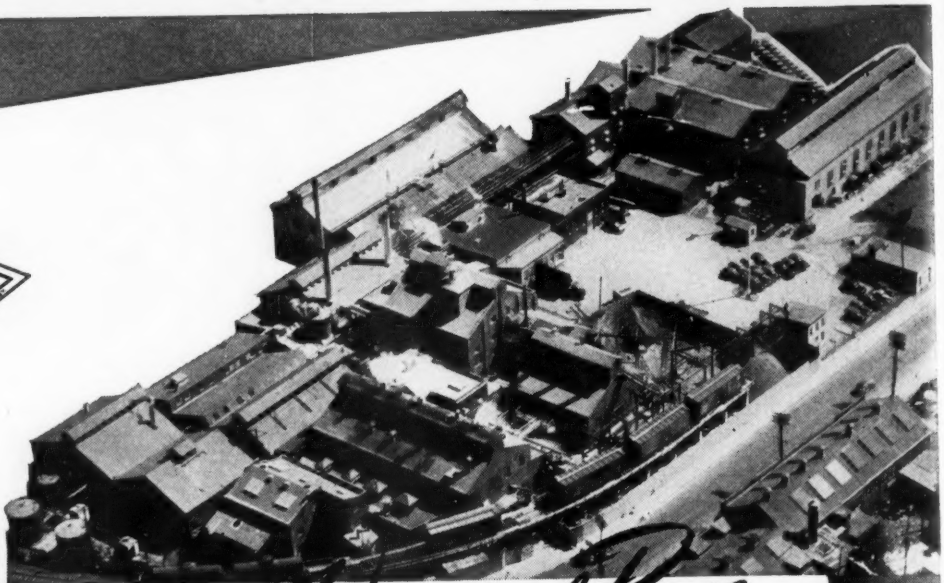

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Editorial

Small-Scale Research

by ROBERT L. TAYLOR, editor

RESEARCH IS—and properly, we believe—generally accorded the lion's share of credit for the outstanding record of progress made by chemical industry over the past two or three decades. And as a result of the innovations that have been wrought in materials and methods during the present war, it has been further covered with laurels. Usually, however,—and again, we believe, in accordance with what appear to be the facts—most of this resultful research, especially in later years and during the war, has been attributed to large organizations.

Size alone in an enterprise undoubtedly lends much to the amount and effectiveness of the research that it can carry on. Unfortunately, however, many small manufacturers in the chemical field, and we are thinking principally of some in the so-called specialties classification, seem to have interpreted this situation to mean that research on a small scale does not pay, that it is a luxury to be indulged in only by the big and the rich.

TO JUNK THIS POINT OF VIEW, and prove to themselves that it should stay junked, is one of the principal jobs of small chemical manufacturers who plan to stay in business after the war and who do not already have a carefully prepared program of postwar research. Research on a small scale *will* pay off if it is intelligently planned and directed. If it is not, it is admittedly a sure way to get rid of a lot of money fast.

The first step for the small manufacturer, then, is to stop thinking of research as an expense. Get it over on the investment side of the ledger where it belongs. And be prepared to keep on treating it as an investment, which means placing it in the best possible hands and keeping objectives and progress under constant watch.

Inability to provide competent direction has probably been the most frequent cause of failure of small-scale research. Finding the right man or men, as is so ably emphasized by Dr. E. C. Williams in his lead article in this issue, is the all-important problem, regardless of the size of the budget. There is where the large company has its greatest advantage. It is usually able to offer greater inducements to men of ability. However, for the small company with a research budget of only a few thousand dollars, there are several highly reputable and capable research organizations throughout the country that could be entrusted with the program. In some states, university laboratories and personnel are available to local manufacturers on a fee basis. In several fields outside of the chemical industry, the smaller companies have found in some form of cooperative research at least a partial solution to the problem.

This latter, however, will not provide competitive advantages within one's own field, which is one of the chief objectives of research in a capitalistic economy. The same can be said of government research, although it may perform a valuable service to an industry as a whole in providing basic information on which individual companies can proceed further.

THE AMOUNT OF MONEY that should be put into research is always a question. It is something for which there is no standard. In the chemical field it ranges all the way from zero to perhaps as much as ten per cent of gross sales in unusual cases. Probably an average for the chemical industry would be in the neighborhood of 1.5 per cent of sales. If laboratory space is to be provided and equipped, the capital cost will probably be somewhere near the annual operating cost.

The cost factor is cited more often than any other by small chemical manufacturers as the reason for not carrying on research. It is a poor reason. With few exceptions it is highly questionable whether a manufacturer who cannot afford research can afford to be in the chemical business. If he persists he is exposing his or someone else's money to extreme risks, especially in the postwar free-for-all that seems almost certain to result from the attempt to maintain wartime production levels in a competitive market.

The chemical industry is a fast-moving industry and it will continue to be so. The rate of new developments and improvements is likely to accelerate as more and more companies, employing more and more trained technical personnel, compete for a larger share of the consumer's dollar. There will be room enough for the little fellow, for in many specialty lines he enjoys inherent advantages over his larger rivals. But to retain the full benefit of these advantages it will be more necessary than ever that he keep up with or ahead of the parade on manufacturing costs and product quality, that he make research literally one of the cornerstones of his business, if it is not already.

Patent Victory

The U. S. Supreme Court's recent decision in the Hartford-Empire case was at least a partial victory for the patent system, which is more than can be said for the prior trend of court rulings toward compulsory licensing of patents.

If reaffirmed, the interpretation—of late in dispute—that a patent is private and not public property; that "a patent owner is not in the position of a quasi-trustee for the public or under any obligation to see that the public acquires the free right to use the invention—he has no obligation either to use it or to grant its use to others"; that refusal to license a patent, or restriction or limitation of licenses, are not illegal unless used in restraint of trade.

Perhaps it is not too much to hope that we may eventually get a working system that will eliminate the abuses of the patent privilege without destroying the sound principles of protection on which it was founded.

Phthalic Anhydride Picture

The latest addition to that growing list of materials which would appear to be in excess supply in the postwar period is phthalic anhydride. Production in 1944 was approximately twice that of 1940, and at present a further large plant expansion is under way. An eventual capacity of over 160,000,000 pounds per year, nearly three times 1940 production, is forecast by some.

A significant point as far as postwar outlook for this huge capacity is concerned is that 98 per cent of present total output is reported to be going directly into the war effort. And although one new major end use has been developed (dimethyl phthalate as an insect repellent), most of the increase represents war-need expansion of certain prewar outlets, principally phthalate plasticizers and vat dyestuffs.

Continuance of the present phthalic consumption of 30,000,000 pounds per year for dimethyl phthalate insect repellents after the war is unlikely, as the demand for this type of product under normal civilian living conditions is uncertain. Moreover, with the promise of increased postwar activity in the insecticide field in general, there may well be keen competition from other materials.

Wartime production of alkyd resins from phthalic anhydride and glycerine has varied a great deal because of the huge military demands for glycerine in other channels. Great strides have been made in the quality and acceptance of alkyd resin coatings, however, and it is likely that postwar consumption will outstrip prewar figures and will continue to expand. The principal element of uncertainty here is the growing tendency to use other polybasic organic compounds as well as phthalic anhydride.

The present wartime consumption of phthalate plasticizers probably can be expected to remain reasonably stable, with a fair possibility of market expansion if the peacetime demands for synthetic resins come up to expectations. This picture is somewhat fogged, however, by a further question concerning the exact position that phthalate plasticizers will occupy in competition with sebacates and organic phosphates.

As far as vat dyestuffs are concerned, it is questionable if the present phthalic anhydride requirements for the preparation of anthraquinone, the base material, will continue at the present high level, although postwar use of vat dyestuffs is expected to show a sizeable increase over their use in the prewar period. Quantitatively, dyestuffs represent but a small fraction of total phthalic consumption.

A final factor which will have an important—and perhaps even determining—effect on the picture will be the availability of naphthalene, only phthalic raw material to date. Phthalic anhydride production in 1944 is equivalent to some 60 to 70 per cent of the total naphthalene that could be supplied if all coke-oven tar produced in 1940 were processed. The expected postwar recession in steel production may well mean that available domestic naphthalene will be insufficient to supply the phthalic anhydride demand and other uses for naphthalene, too. Thus it is entirely possible that actual postwar phthalic production may be determined more by how much imported naphthalene is available and how much phthalic anhydride may be available from the war-developed source of ortho-xylene from petroleum (and at what price) than by the size of the potential market at present prices.

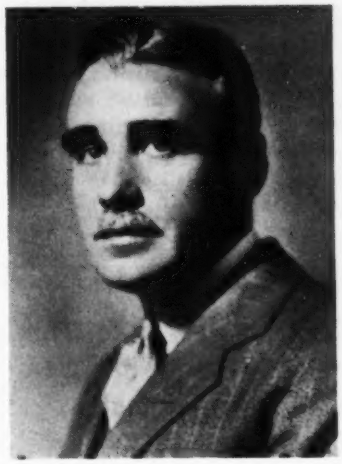
Petroleum Figures

The American Petroleum Institute has issued its report on new petroleum reserves added to the oil supply of the nation during 1944. Despite a record crude oil production of 1,678,000,000 barrels during the year, the report states, the discovery of new oil amounting to more than two billion barrels resulted in a net gain in the proved oil reserves of the country of 389,000,000 barrels, bringing total proved reserves as of December 31, 1944, to 20,453,231,000 barrels.

The Institute vouches for the above figures as "fair, unprejudiced, and representative." However, chemical people who work with petroleum figures should be sure they know what they are about. As the Institute itself points out, the mere knowing that we have over twenty billion barrels of oil in the ground gives no indication of the time and expense that will be required to get it out. The rate of production of oil from a given field is tied up directly with the characteristics of the permeable rocks in which it occurs in that field. As a matter of fact, the Institute states that "today's known oil can be recovered only over a period of many years and at gradually declining annual rates."

Therefore, you can regard as wrong from the start anybody who, through arbitrary division of the known reserves by any current or anticipated rate of consumption, tries to estimate the life of proved reserves of oil. It just can't be done.

MORE AND MORE OF THE TOP MANAGEMENT JOBS in chemical industry are being filled by chemists and chemical engineers who have come up through the ranks of research or other technical departments. Yet to be a good chemist or chemical engineer obviously is not alone sufficient to make one a good manager. Some of the other requirements, and some of the objectives of technical management, are discussed here by Dr. Williams, who, incidentally, after five years as Ramsay professor of chemical engineering at the University of London, has served in high technical and executive capacities in the British Dyestuffs Corp., National Benzole Association, Shell Development Co., General Mills, Inc., and now General Aniline & Film Corp.



RESEARCH MANAGEMENT

And Its Relationship to Other Chemical Company Functions

by E. C. WILLIAMS, Vice-President and Chemical Director
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THE problems of marrying science with industry have been my enthusiasms, as they have been my profession, for more than twenty-five years.

These years roughly cover the period of phenomenal growth of chemical industry in America and in England during which the purposeful organization of science for the service of industry has become a mainspring of national progress and security.

It has been my good luck, through work and friendship with most of the outstanding leaders in chemical industrial affairs of both countries, to have seen, or experienced in practice, about all possible variations of "scientists in management" and "management of scientists." The essential condition for success can be summed up in one sentence: *Find the right leaders and the mechanism of organization or management becomes secondary; fail to find them and no organization or authority will bring more than routine successes.*

The functions of scientists in industry are so numerous and extensive—and costly—that orderly direction of their activities is a matter of considerable importance. Their work is so specialized, and in many respects, not least in the spirit of its performance, so unique, that it can only be effectively directed by one of their own kind. Yet it must be directed so that the objectives of management are attained; hence the growing entry of chemists into the circle of management proper.

The entry of scientists on a major scale into industry has been of such comparatively recent origin that the full impact of their contribution to management has not yet been felt, in some cases hardly felt at all beyond the conduct of purely technical departments. Yet their trained scientific, analytical approach to their problems can bring wider benefits to the industries which they serve.

I suppose the average age of the true scientific workers in industry, amongst which we should not include those who have merely graduated with technical degrees as part of a general educational background, is little more than 30-35. There is therefore still a comparative dearth of men possessing the maturity of judgment and experience necessary to guide the enterprises which are based on the forces which they are themselves creating.

The effective application of these forces is only secured when they are geared to other parts of the industrial whole, particularly to production manufacturing and sales. It is to the securing of such unity of objective and effort that the chemist in management must be particularly alert. It is not enough to create and inspire the efforts of scientific workers as an exclusive body because their efforts are valueless until they are integrated with and contribute to all aspects of corporate activities.

The success of this integration depends to the largest extent upon the understanding and vision of the top executive of the organization, its president, but it depends equally on the understanding and ability of scientific leadership to build bridges between the scientific, operating, and commercial divisions of the organization; bridges which must not only be strong and filled with traffic, but easy and pleasant to pass over. There should be no "Keep Out" signs around technical departments, nor jealous guarding of territory.

Failure to carry out this first simple principle has caused more difficulty to the smooth course of technical progress than perhaps any other cause. It may be due to something inherent in the mentality and philosophy of the scientist, perhaps something of intellectual snobbery. Yet this is in no way inherent in his science, and, if it exists, it is more likely to be a failing of the worker himself.

Perhaps long association in school or college with immutable laws of nature, and his struggles to discover and apply them, have made him careless of human weaknesses and illogicalities. He has not

found it of any consequence, in the work he is in, to humor intractable reactions or to expect compromise from a mathematical equation. He has been trained to determine facts, to arrive at conclusions based on facts, to establish theories and to recheck by rigorous experiment and observation the validity of his theories. Only then does he allow himself to generalize.

The scientist is, to some extent, working in regions above the level of personal interest.

All these processes are amenable to strict reason. Upon successful completion they stand for him as demonstrable truth which can only be challenged by equally rigorous analysis accompanied by open disclosure of the contrary facts for scrutiny.

Because there is no need for the exercise of human qualities in such work one sometimes finds a lack of appreciation of the importance of human qualities.

The scientist is, therefore, to some extent working in regions above the level of personal frailties or self interest. He is lost in an atmosphere of generalities or conclusions unsupported by facts. More especially is he repelled by any deliberately biased or partisan presentation of facts to support a case. He is not accustomed to having to carry people along with him. It is not so with the lawyer, the salesman, the business executive, the politician, or the mere self-seeker whose prime interest is his own well-being. Yet before the work of the scientist can be made effective in industry, he has to reckon, or someone has to reckon for him, with the existence at least of such influences.

If error wins in face of truth, it is usually because truth has had the weaker exponent.

No one wishes the scientist to compromise in his rigorous consideration of the laws of nature or behavior of matter. He would be a charlatan if he did. But he must realize, as he enters wider fields of cooperation and management, that many factors are involved which are not amenable to natural laws or experimental proof. In these regions personal opinions and reactions, which are contributory to judgment, may carry the day, and in cases of dispute sometimes carry it in the face of facts. Powers of exposition and persuasion become more potent than mere knowledge, and if error wins in face of truth, it is usually because truth has had the weaker exponent.

Argument is a stimulus to progress and action, and within reason should be encouraged. But let us remember that the whole point of argument is to persuade the other fellow to accept your point of view (you being equally open to accept his), not primarily to prove that you are right. Great harm in the long run is done by proving too often that you are right; if you get your views accepted without the other fellow being shown to be wrong, you have succeeded in the best possible way. Don't bother too much about who gets the credit.

Distinguish between what is stated as a fact and what is stated as an opinion.

The scientist has as much right to his opinions and personal reactions as anyone else; even more right when he has proven facts behind him. But he must be careful to distinguish between what he states as a fact and what he wishes accepted as his opinion. His colleagues have the right to know in which category his statements lie, and to know whether they are being asked to act on established fact or on faith in someone's opinion or judgment. And here let us remember a good working principle which should govern any presentation of scientific or technical work. It should contain not only the evidence upon which its conclusions are based, but have that evidence so fully and fairly set out that the reader can, if he so wishes, arrive at and defend any alternative conclusion that the facts will bear. To make this easier, the art should be cultivated of expressing scientific accomplishments and evidence in language so clear that it is understandable by the intelligent layman. This principle is, from a purely selfish point of view also, a protective one because with opinion so separated from the facts on which it is based, it is easy, when a new fact appears, to change one's opinion with no loss of confidence.

The fruitful zones of difficulty and therefore of opportunity in management lie in those regions where fact, opinion, authority, and responsibility meet. Good judgment, the first step towards good management, will recognize these zones automatically and force none beyond its limitations. Good management will see that although, within the complex pattern of modern industry the work of the scientist impinges in countless directions, the responsibilities for its various functions are clearly defined and assigned.

There can be no set pattern applicable to all organizations, and when you find a "happy ship," you will usually also find that the assignment of responsibilities has been governed as much by the qualities and capabilities of the men available and by the past history and growth of the organization as by any theorietic ideal of what men ought to be. The fact that a system works well in one organization is very little criterion that it will work well in another. You may get hints on things you have overlooked and ideas as to how to solve your own problems of organization, but to adopt them wholesale is a sign of lack of imagination and realism. The secret of good administration is to find the best men you can, study their strength and weaknesses, and frame your organization to make the fullest use of them as a team.

There are some industries, which have been substantially created by an individual or small partnership, where the control of technical affairs, manufacturing, and sales remain in the hands of one man. If he is competent and imaginative, as he probably is, since he created the enterprise, that is an ideal situation from the point of view of speedy action and quick response between various divisions of the company's activities. But such utopias don't usually last long. If the enterprise is successful, it usually becomes too big for such unified control, and there is always the danger that the head of it may become tired or autocratic.

The first breakdown of responsibility is usually the division of Sales and other commercial activities from Production, whereupon the first deliberate planning of liaison begins. Where it is not planned, confusion, perhaps friction, usually sets in around the same time, and the scientific staff, which has hostages in both camps, begins to feel it as soon as any. Under such division, the scientific control of production, the improvement of production techniques, the maintenance of product quality, and research into new activities, in all of which the chemist is particularly active, fall naturally as departments of production. If the production executive is, as is likely to be the case, also the executive in charge of research, the whole technical forces of the enterprise are likely to be well directed to common objectives, and the transition of work from research to pilot development to manufacturing will cause no particular problems.

With further growth, and more rapidly in the more technical industries which depend for their survival upon the creation of new products or activities, the next

decentralization usually takes shape in an independent research and development department. Since this automatically tends to segregate the free thinkers and revolutionaries of the industry, it calls for planning of close liaison and the exercise of a positive spirit of cooperation. Such a separate research and development department can, in the last analysis, only be advisory in nature; alone it can accomplish nothing. The more therefore its cooperation with other departments can be based upon intimate personal relationships and recognition of worth, the happier will the company be. It will be more able to withstand the conflicts of opinion which are healthy and natural in a growing industry, or better still be able to transmute them into dynamic forces.

For this reason it is good that, on the one hand, the research laboratories should have some work on their program which is of close and immediate interest to the factory, while the factory laboratories should be encouraged to do some work of a definite research nature in their own longer term interest. Adoption of this principle alone can do much to produce that compatibility of minds between research and manufacturing men which is so much to be desired. It establishes a common ground where men wish to meet for the very good reason that each can benefit from the other. It is rather elementary, but often forgotten, that the best way to win the wholehearted cooperation of another is to want to help him do his job without at the same time wanting the credit for doing it. Beware and be suspicious of anyone who, in a cooperative enterprise, wants it to appear that all good is of his doing; even when right he is a bad influence and will do harm in the long run.

There is danger in deliberate overlapping of endeavor.

Of course there is a danger in such deliberate overlapping of endeavor; not so much in the duplication of work which to some degree is good, but from ultracompetitive individuals or minor groups desiring to prove that they are smarter than the other fellow and keeping back that which might help the whole for the sake of the credit it may bring the part. Some scientific workers seem a little prone to that, and good management should educate them out of it while they are young. No one who shows it is fit to be an executive, even in a minor capacity; indeed, he is almost more pernicious in a minor capacity because he can mislead and distort the judgment of his chief to whom he perpetually runs with his criticisms or self-interested claims.

Under extreme decentralization, it is usually desirable to establish central research facilities.

Finally, in some of the largest organizations, particularly in those which operate in widely diverse fields, we find further decentralization amounting to separately organized divisions, each with independent managements and separate departments for Research, Sales, Manufacturing, and so forth, subject only to direction on matters of higher corporate policy by the home office. This ultimate in decentralization is often the result of putting together by merger already operating concerns, but sometimes arises from the sheer difficulty of organizing an unwieldy whole, especially when the parts are geographically dispersed or active in radically different fields.

In the case of such extreme decentralization particularly, it has been found beneficial to establish a central research organization to carry out investigations either so fundamental or so in advance of the immediate interests of any one division that they are best conducted under authority of over-all management.

It is obvious that under such a variety of conditions no set pattern for the conduct of scientific work can exist and that each industry must frame that organization which suits its circumstances best.

While with increasing decentralization the need for orderly planning becomes greater, the difference between "planning" and "control" becomes more evident. The two are often confused.

In a one man or small partnership organization the chief, being experienced in all phases of operation, can effectively both plan and control. He can keep abreast of all material facts and act promptly with good judgment in accordance with them. In short, he can control because he knows precisely what is happening and reacts quickly to the full significance of the facts.

But the same circumstances which make decentralization necessary tend to make it impossible for the single head to be currently conversant with all facts or to be able to exercise informed judgment on many matters requiring quick decisions. Thus, while he can plan, he cannot control—at least not efficiently. To attempt to do so is a common and venial fault often found in technical men in positions of management. The very fact of their being personally skilled at the bench is sometimes their greatest stumbling block. They try to arrive at conclusions as they have been wont to do, but forget that they are no longer in a position to know all the facts or observe all the phenomena on which conclusions and decisions should be based. For this reason vital research progress is usually found to spring upwards from the laboratory bench or plant rather than downwards from the directorate.

The best laid plans for scientific effort are continually upset by happenings quite outside the prevision of the planners and much of the information available for planning can only come from the skill in experiment or observation of the man at the bench. Provided the man at the bench is also imaginative, he clearly is in the best position to recognize how the plan needs to be changed in accordance with the facts. In any case, management must be largely guided by what he reports.

For decentralized work, a prime necessity is a quick means of exchange of information.

Good planning, under such conditions, consists in such coordination of effort that each responsible person is fully informed of the factors which can help him to recognize what facts and observation are important and arrive at correct decisions on matters for which he is responsible. Responsibility, in this case, necessarily implies a full understanding of the relation which his decisions are likely to have on the decisions of others and therefore on the harmony of the whole. A prime necessity for the efficient conduct of decentralized work is therefore an automatic and quick medium for the exchange of relevant information between the different units of the whole.

The most important consideration after the right choice of men is the right choice of objectives.

The most important work of the chemist in management is in the conduct of research with all that includes in the way of fundamental research, divergent and convergent investigations, process development, chemical engineering, valua-

tion of new manufacturing techniques, application of products to industrial or consumer needs, etc. We shall not consider here so much the art of research leadership and the organization of research laboratories (which is another story) but matters which integrate research as a function of management. For the same reason we will not discuss details of accounting, budgeting, personnel selection, methods of reporting, patent procedure, all of which are necessary ancillary functions.

The most important consideration, apart from the right choice of men, to which I would direct your attention is the method of choice of major objectives for research. These may lie in one or other of the following categories, and any single objective may involve problems in many of these categories.

1. The improvement of existing products, or manufacturing techniques—beyond what is the proper function of manufacturing.
2. The development of new products within existing lines of company business.
3. The development of products in entirely new fields—diversification of the company's business.
4. Chemical engineering research to develop new techniques and types of equipment for use in the company's operations.
5. Development of processes from the laboratory through pilot plants to the stage at which they are demonstrated as ready for acceptance by production. That is to the point at which production has reliable data on which to make its own cost calculations and engineering designs.
6. Coordinating research with customer requirements to ensure that proposed new products are appropriate to the purposes for which they are intended.
7. Exploratory investigations to scout the technical possibility of new ideas whether market inspired, research inspired, or production inspired.
8. Fundamental research for the winning of basic konwledge relative to the company's interests—the foundation upon which all the above items ultimately depend.

Problems soon begin to make themselves evident after an objective is decided upon.

Specific objectives still remain to be chosen. Objectives are not in themselves problems, neither does the statement of an objective define the problems to be solved. However, the problems soon begin to make themselves evident after an objective is decided upon. They usually cover a still wider territory than the eight categories already mentioned; for example, market and economic surveys, engineering studies, probable trend of competitive or customer industries, the relation of probable plant requirements to existing plant facilities, the availability of raw materials or by-products from existing operation, the harmonizing of the proposed objective with the current interests and experience of the company, and the likelihood that research will be able to accomplish the technical tasks necessary to achieve the objective.

The majority of objectives in practice arise from some recognizable need of the company. It may be from the failure of its products to meet specific requirements; or from high costs of production which may, in turn, be due to imperfect or obsolete processes, or engineering techniques for conducting them. It may arise from the demands of outside customers for new types of product or from one's own initiative in introducing new products of potential value to industry.

Select the most promising lines of work and determine the relative effort to be expended on each.

Whatever the urge may be, whether from within or from without, we have to select the most promising lines to work along and determine the relative effort to be expended on each. These are the goals we would like to reach, and may at the outset be quite specific or entirely nebulous. But their choice is a fundamental decision of management because, once made, it consumes the organization's power to do research and launches forces which cannot be quickly recalled. It may be months, or years, before it is known whether they will be successful or not. And it is destructive to morale to change horses too often.

From a management point of view we need, therefore, an analytical group to reduce suggestions, or pipe dreams, or hopes, or even more or less specific demands, to concrete terms in such form that management may express its judgment and preferences—at least tentatively. It is too much to expect that enough information will normally be available at this stage to make final decisions.

This preliminary survey must represent the combined intelligence of marketing, manufacturing, engineering and research. Rather special qualities are required in the men who make it. While it is not necessary that they have skill in the actual conduct of research, production, or marketing, they must be able to dissect and expose the elements of the matter. They need not attempt to solve, or even suggest solutions for, the problems which they expose. It is not necessary that they even have the ability to solve them. But that does not matter because we have other groups to do that; just as other groups may discover new reactions or techniques without having the slightest conception of how to apply them to useful ends.

Research problems may originate anywhere from within or without the organization.

Similarly, we may use economists to analyze trends of costs, markets and prices who may be unable to go out and sell anything successfully; or conversely, men who seem to be able to sell anything in spite of its having no demonstrable value.

At this stage we make use of analytical and critical rather than constructive, creative, or managerial talents. The matters that come up for analysis may originate from anywhere within or without the organization. They range all the way from complaints about the performance of the products to dreams of entirely new industrial materials or concepts for their use.

They may be Research inspired, Production inspired, Sales inspired, or Customer inspired. The discovery of a new reaction, or a new product, or a new technique through basic research in the laboratories may throw light upon hitherto intractable problems and catalyze all the above sources of inspiration. So may the vision of some sales representative catalyze the whole forces of research.

Following the critical analysis must come an "Appreciation of the Situation."

Arising from this joint effort of critical analysis there comes what I call an "Appreciation of the Situation" for the guidance of management. Such an appreciation contains a statement of the facts so far as they are known, and attempts

to appraise their hearing upon the interests of the company. It indicates the weak points in the chain and tries to identify what must be accomplished before the objective can be attained. It further evaluates, as far as possible, the potential scope of success and rewards to be won. It should indicate the differences of opinion or conclusions which the facts warrant. If it can, though this is hardly likely yet, it should attempt to forecast the probable time and cost of reaching the objective.

In short, this "appreciation," by disclosing the main issues, both known and unknown, invites and makes possible a management decision by presenting the facts upon which decisions can be made. It makes possible a rough, very rough, estimate of the nature and scope of the tasks involved.

We might call this the "diagnostic" stage of research because it corresponds somewhat to the work of the diagnostician as a precursor to the operative surgeon.

In the preparation of this analytical survey calls are of course made, wherever desirable, on the appropriate departments of the company qualified to give advice and information. Requests may also be made, where circumstances justify, for limited exploratory experimental work.

Do not separate Research, Production and Sales when considering matters of common interest.

Briefed by such "appreciation," management now has something to work upon. Management, in this context, means the chief executive, that is the president of the company, with his economics expert in council with the heads of Production, Research, and Sales.

To separate these three prime controls when considering such matters of communal interest is the most fruitful cause of divided counsel and delay, calculated to bring even the best and most cooperative of men into misunderstanding, dispute, or even friction. It would indeed be utopia if executives in charge of such major divisions were, from their properly different viewpoints, to see eye-to-eye on even a majority of problems, much less when the conflicting claims of an indeterminable future are at issue. Obviously all should have, and have in unison, so that they can freely debate amongst themselves (written reports and memoranda, though good preparation, are not enough) full knowledge of the company's progress, difficulties, problems and plans, whether of a Research, Manufacturing, Sales or economic nature. No one can contribute of his best unless he knows the whole picture to which he is contributing. He can neither be efficient in the performance of his special tasks nor constructive in planning the work of his department as a contribution to the whole.

Never listen to an argument for one view without having the proponent of the other present.

Let me mention here one particular principle, based on so much experience of its value that I believe it to be universally true. That is, whenever you wish to understand and solve to the satisfaction of all a difficult problem on which there are radical and honest differences of opinion, never, if possible, listen to the argument for one view without having the proponent of the other present. It is not fair to either to hear them separately, because by doing so you take away from each the chance to hear and consider the arguments of the other. You thus do an unconscious injustice to both sides, and above all, to your own chance of forming a correct judgment.

Incidentally, to follow this principle is one of the surest ways to foster a real team spirit within an organization and to avoid or neutralize clashes of personality or ambition. Of course I am referring here to the business leadership of a cooperative team, not to political maneuvering where it is, I am told, advantageous to keep different groups in the dark as to your own plans and conversations.

I would like to say more about the art of leadership, but we must get back to our management meeting.

On the evidence before it, it is not now difficult for management, under the leadership of the president, to arrive at a rational decision, at least on what to do next. The various objectives open are weighed for their relative importance and their relative chance of accomplishment, having particularly in view the magnitude of the goal to be won, and the cost at which it is likely to be attained.

Break down the objective into suitable partial objectives for allocation to appropriate departments.

Assuming an objective to be chosen, it is then broken down, according to its circumstances, into suitable partial objectives for allocation to the appropriate executive departments, specifically in most cases, Research, Production or Sales. Particular aspects will naturally go to the patent, legal, or other appropriate staff departments.

From that point on it is up to each department to plan its campaign for tackling its own part of the program, break it down into whatever projects are necessary, and allocate them to the men or groups most qualified to conduct them.

It will take us too far afield to follow the course of research and development projects through their various vicissitudes. I need not tell chemical people that as soon as you get to grips with the problem, it often proves to be something quite different in detail, and sometimes in nature, from what had been supposed. Frequently we fail altogether, but it is surprising how often the mere conduct of the work leads us into new and entirely unexpected discoveries which form the basis for new suggestions and new objectives. It was the head of the General Electric Laboratories, I think, who said: "In fact, unless the experimental failures outnumber the successes, one may usually conclude that little real research work is being carried on."

No organization can move unless it has a clear idea of where it wants to move.

But no organization can move unless it has a clear idea of where it wants to move; that is, of its objective. We have seen what can be done by organization to steer research into fields which at least are logically arrived at and represent the best judgment of management. But it will be realized also that, if the objectives are amenable to definite analysis and planning in this way, it is almost axiomatic that they will be as open to the analysis of others and can, therefore, hardly be expected to result in radically new advances.

We must not overlook, therefore, provision for spontaneous generation of ideas. We recognize that most of the really outstanding advances in industry have arisen from the enthusiastic initiative and perseverance in the face of difficulties of individual research workers. A major task of management is accordingly, first, to encourage and provide environment for initiative; second, to recognize sufficiently early the merit and impact of original conceptions, provide the correlative studies, and back them with all the sup-

port that organization can give. This is one of the greatest opportunities for, and the greatest tests of, enlightened management. It is easy to advance irrefutable (not necessarily correct) arguments during the early stages why a novel conception should not work; it takes a higher intelligence to see that it might work, and an exceptional one to make it work. Obstacles are overcome and things are created by those who see opportunities in their difficulties rather than difficulties in their opportunities.

Industrial progress can take place by two mechanisms: wave motion and jump motion.

I think of progress in industry taking place by two mechanisms; a wave motion, and a spasmodic or "jump" motion. Progress by wave motion consists in pushing forward the front which the art has already reached by carefully planned attacks at points in the line which offer good promise of yielding results. One probes and learns more about what one is doing, experiments with variations that might lead to improvement, employs new techniques or instruments to perfect and cheapen methods of manufacture, builds better qualities into the products, and so forth.

This type of thing is going on all the time in every progressive industry and is well amenable to organization and management. It requires research and technical ability of a high order because presumably existing standards are already high and require much skill to raise them.

"Jump" motion, on the other hand, is to a large degree the result of unexpected or novel advances. It comes from a different mental approach. Not "how can we improve our method of doing so and so" but "why do we do it that way at all; surely there must be some better way of reaching that objective." That is a good spirit to foster.

It is good to have a few revolutionaries around. They act as mental stimulants.

It is almost impossible to plan such approaches; they represent the revolutionary attitude of discontent. We want some revolutionaries. They stir up things around them; they cause trouble sometimes with colleagues, but they act as mental stimulants, too. They do not like being organized; they try to shake your confidence in what you have staked your effort and money on. All right, let that be a part of your plan; it is good to have a few revolutionaries around. Don't try to organize them, but do let them know what you are trying to do so they can have something to shoot at.

I have found it a good plan, when there is no good revolutionary and everyone seems agreed and satisfied or perhaps complacent, to ask someone to constitute himself a revolutionary, to act as devil's advocate, and in council deliberately attack the conclusions that have been arrived at. This has often proved a helpful way to check one's conclusions and expose one's fallacies.

So much for the relations of the scientific worker in relation to over-all management. I would now like to consider some aspects of the cooperation between Research and Development and other divisions of the company.

THE RELATIONSHIP OF RESEARCH AND DEVELOPMENT TO PRODUCTION AND SALES

It is easy to appreciate that with the development of any project through the various stages of fundamental research, process development, and pilot plant trials on the one hand, to commercial production, industrial application, customer acceptance and sales on the other, there are many opportunities for confusion, divided interest, and duplication of effort arising from uncertainty as to who is responsible at any particular moment for "carrying the ball." "Solving the jigsaw puzzle" would be a better simile. Actually, different parts of the jigsaw may have to be solved by different people at the same time, because if you cannot solve one part, it may be useless to finish the others.

The test of good management lies, therefore, in having a clear conception of the talents, responsibilities, and interests of others and ensuring that once major policies have been settled, work is properly distributed and carried through to its objectives.

The emphasis on the work itself, as well as on who performs it, may require frequent revision and distribution according to the course that it is taking. In this respect the method of working of the creative chemist, or similar scientific worker, in the chemical industry, differs in a basic and fundamental way from that of the engineer; I do not refer here to the purely inventive type whose invention has also to perform functions which are outside the realm of engineering proper.

Ask an engineer to design a machine to perform a certain mechanical function, or build a bridge to carry specified traffic, and, given time, pencil and paper, he will be able to plan and forecast pretty exactly what is going to happen at all stages up to the completion of the job. And he knows that his creation will work. Every bolt and joint and shape and surface will be as he planned it to be. It will perform the function he planned it to perform.

He knows where the component parts of the job will be at any given time: weeks, months or even years ahead, whether in the drafting room, in the foundry, in the steel mill, or in the machine shop, on the job site, or in course of erection.

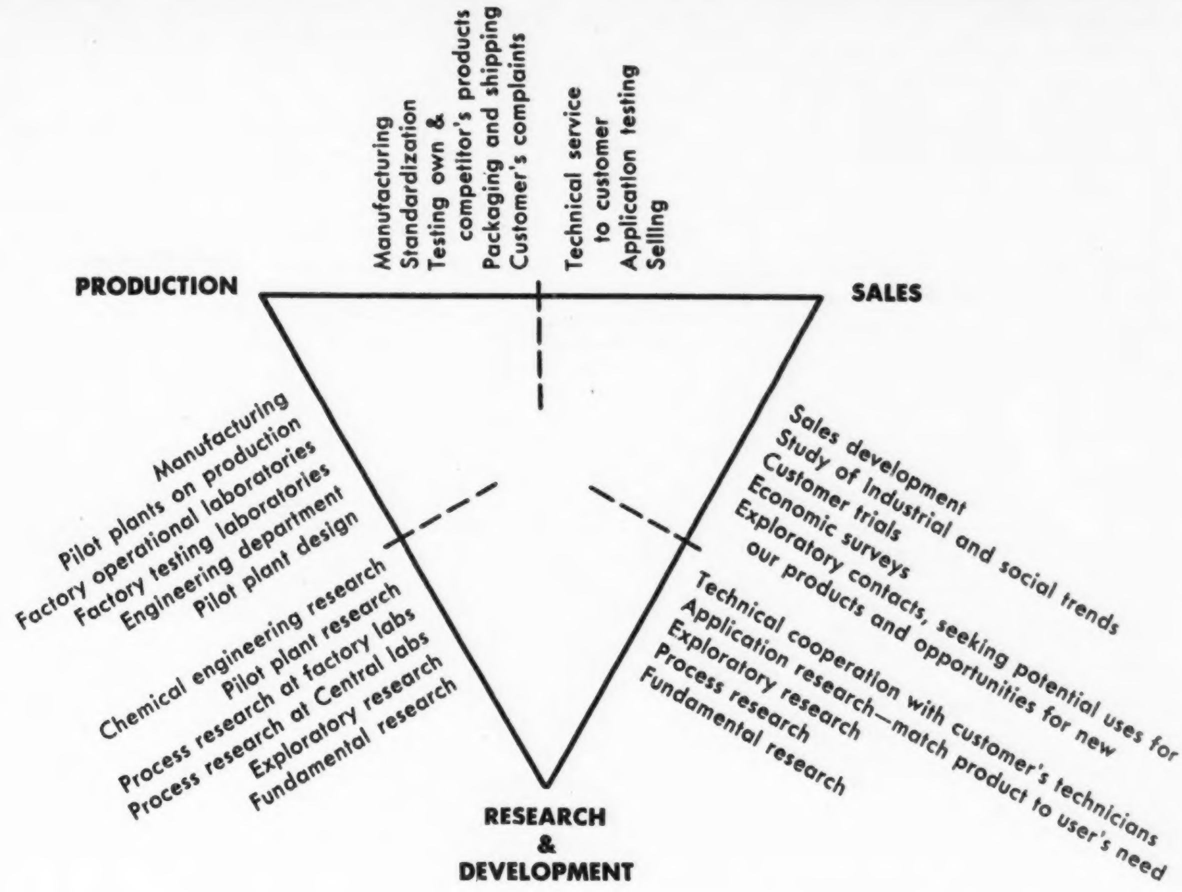
The parts will flow together at appointed times and places, and they will fit. They won't move sideways or backwards, or hesitate, or blow up.

The engineer does not expect to find at a late stage that something has come out wrong so that the whole job has to go back to the drafting room or to his own office so that he may reconsider what to do about it, or drop the project altogether.

Yet that is exactly what does happen in the normal course of any major new enterprise in the chemical industry. It is often neither wave motion nor "jump" motion, but Brownian movement.

The organization to handle a new chemical development must be flexible and fast working.

To an engineer it must look rather like a basketball games does to a layman. He might wonder why, when the objective is to put the ball in the basket, people throw it around and bounce it in such apparently unproductive directions. Yet basketball is far easier to understand than the movement of a chemical industrial development. You can at least see your adversaries in basketball and maneuver to elude them. In the chemical game you usually don't know your adversary is there until you hit him. The course of any worthwhile achievement in chemical industry is a succession of collisions with unexpected adversaries, extrication from which may mean calling at short



INTER-RELATION OF EXECUTIVE CONTROLS AND SOME TYPICAL FUNCTIONS

Dotted lines show approximate administrative boundaries. There is latitude for judgment, according to circumstances, as to where the latter are drawn; but they must be drawn somewhere to prevent confusion arising from a potential "No Man's" or "Everyman's" land.

notice for some partner, who has the particular skill, or experience, or talent to overcome the difficulty that has balked you.

The organization to handle such a situation must clearly be flexible and fast working, expecting the unexpected, and ready to regroup its forces or change weight as circumstances demand. In such organization we should particularly guard against the danger of drawing hard and fast lines (which the project itself can hardly be expected to observe).

The prime requisite is to have as few as possible independent executive controls responsible to management. There is then less chance of clash over questions of divided interests or responsibilities which, with the best will in the world, cause delays and confusion.

Three such controls are normally necessary and sufficient; Research and Development, Manufacturing, and Sales. These three can, subject to the guidance of management, expeditiously execute the policies of management.

The mechanics of management increase in geometric proportion to the number of controls.

The mere mechanics of management, as well as the executive conduct of the work itself, increase in geometric proportion as this number is increased with little or no corresponding advantage and usually with the disadvantage of the delay inherent in reconciling or compromising independent counsels. Too often what is done under such circumstances represents only the lowest common denominator rather than an aggressive policy. A large group is of value as a forum for the ventilation of opinion but not as an executive body.

The above number should therefore, in my opinion, be increased only for very special reasons; for example, in large and dispersed companies, and then only when executives with long experience of working together are available.

Naturally, each of the above executive departments has as many specialized groups responsible to them as are necessary to carry out the varied functions involved.

We can diagrammatically develop a functional triangle to show how these various functions and controls are related to each other; not statically, but growing towards and into each other. (Probably a sphere would be a better geometric shape, best of all a spinning one!)

The apexes of the triangle represent the three controls. The functions of any

one control are shown along the sides leading from its apex.

Functions concerned entirely with one control, and therefore substantially its concern alone, are shown nearest to its apex. Thus, routine manufacturing, regular sales, or fundamental scientific research, fall in this category.

Moving away from any apex are written the other functions of the control in order of increasing interest to that control towards which they are moving. There is, of course, no absolute significance about the functions detailed in the attached diagram; they would be modified to suit the circumstances of any organization, but the principle involved is clear.

Functions of interest to two controls cannot effectively be conducted without the active cooperation of both.

At, or about, the middle of each side of the triangle we logically and inevitably arrive at those functions which are of such interest to two controls that they cannot effectively be conducted without the active cooperation of both; and it is only for reasons of good administration that they must be placed under one or the other. For example, in the zone between Research and Sales there is a very fluid condition expressed on the diagram by "exploratory contacts, seeking potential uses for our products, and opportunities for new" and "technical co-operation with customers' technicians."

The first represents effort to find outlets for new products whose functions and properties are rather well established and whose acceptance depends chiefly on skillful and informed presentation to the customer. This is best carried out by technical men in the Sales department. It is their duty to open up new fields of uses based on known properties. They usually fall back on the research staff only when some unexpected or special problem arises.

The second of the above two functions deals rather with new products, which are by no means yet proved to be valuable for the customer's need; products, for example, which still need modification in properties to meet the user's requirements. Frequently much adaptation and demonstration is required to persuade the customer that the product is of any use to him at all. Sometimes the manufacturer has to carry out extensive investigations in his own laboratory on the problems of the customer. Sometimes the customer will need to modify his existing products or methods of manufacture to gain the benefits of the new product. There are all sorts of ramifications of this type, and in practice the problems are best solved, or are only solvable, by close cooperation between the research laboratories of the potential buyer and would-be seller. There is no immediate question of sales at this stage because until such work has been done, there is no evidence that the product is worth buying.

I have described these two particular functions only as an example to show how nearly they can approach each other, yet how different they are in mental attack and in the special skills required to perform them. The men for the first function, though technically trained, clearly operate best under Sales administration; the men for the second are research men out of the research laboratories, therefore, under Research administration.

Actually, of course, every problem of this nature is likely to pass back and forth between the two types; one finds the openings; the other solves the problems involved. Frequently they are on the job together.

The same sort of blending of functions, leading at the right moment to the transfer of administrative responsibility, occurs along the other two sides of the triangle; i. e. between Production and Sales, and between Production and Research. The zone of "pilot plant design" and "chemical engineering research" is another good example.

It is just in these regions, where we would like groups to act as single individuals, that we are dependent upon two administrative controls acting with such perfect understanding that the ball may be thrown back and forth between them according to the circumstances of a project at any particular moment. It is largely a question of good timing and good consideration for each other's interests and responsibilities. If these do not exist, no organization can draw satisfactory lines on a basis of mere authority.

It is the duty of technical management to see that zones of cooperation are efficient and harmonious.

These are the regions where personal ambitions and enthusiasms may, and so often do, cause friction and confusion. Naturally, such impediments occur more readily among the younger staff, close to the bench or plant, who are so enthusiastic in their work that they are jealous for its success. Sometimes, with less reason, they are jealous also for their part in the success.

It is the duty and one of the great opportunities of technical management to see that these zones of cooperation are efficient and harmonious.

Just as company management steered the technical forces, particularly the research activities of the company, towards its broad objectives, so, as the plan is executed, the same mechanisms in reverse keep management informed and educated on the progress and significance of the work.

Good management will not abandon well considered objectives merely because the going is hard.

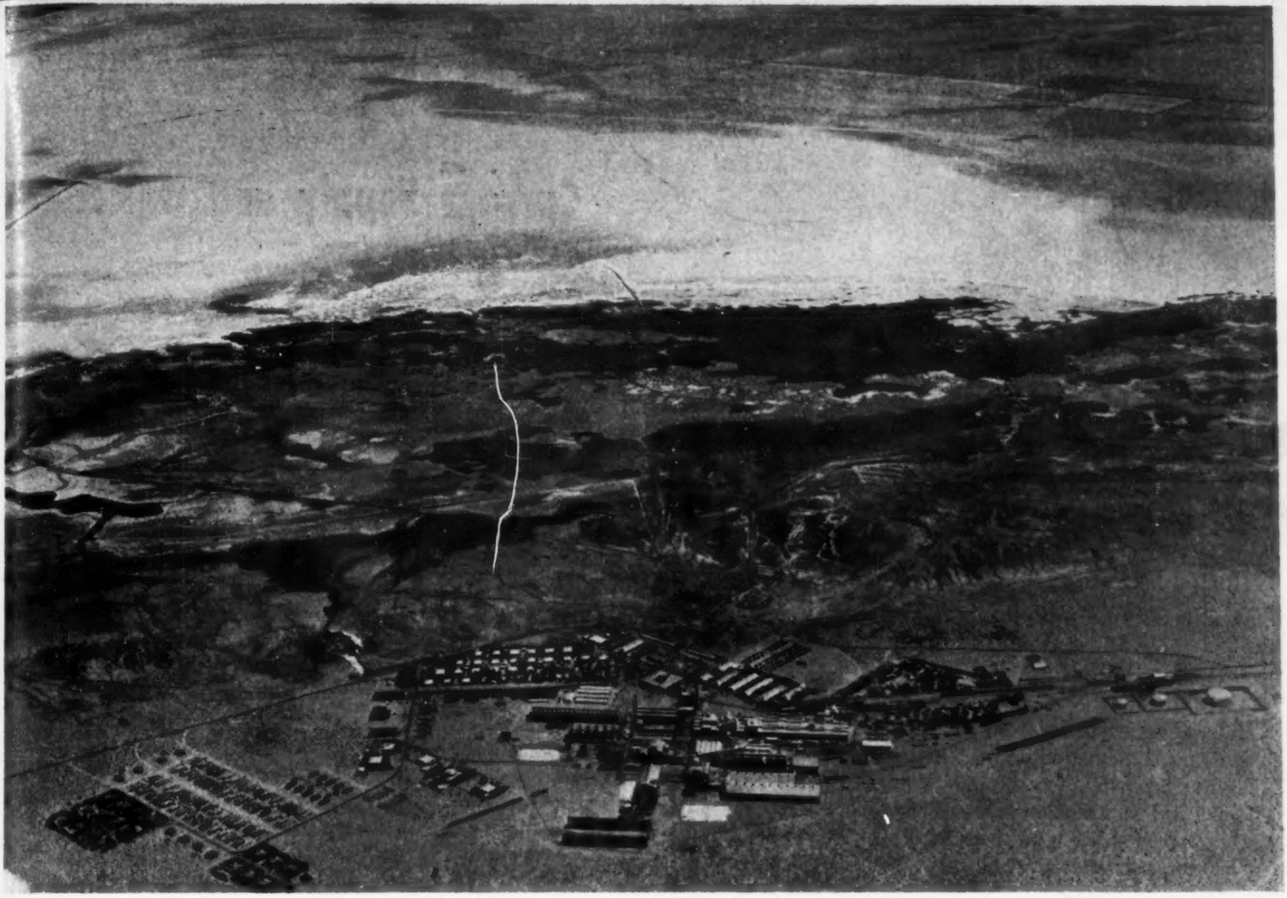
In this way all is kept within the broad policies of management, and decisions can be made either to support more strongly, or modify, or where necessary abandon, any part of the plan.

In the scientific industries good management will not abandon well considered objectives merely because the going is hard or immediate successes disappointing. The most serious condition is when, with the best skill and imagination available, no rational avenue of advance can be seen. In such cases, it is best to terminate, or at least shelve, the project. But before deciding finally on termination, an up-to-date "appreciation of the situation" should be prepared and as carefully considered as that which launched the project on its way.

There still remains, from a management point of view, the decision as to when, in the course of major projects, the actual executive control should pass from one division of the company to another. If I have made my points clearly, such transitions almost indicate themselves and should take place so smoothly that decisions of management will be comparatively easy, except in those cases where the difficulties of the project preponderate.

I said in opening: Find the right leaders, and the mechanism of organization and management become secondary; fail to find them, and no organization can bring more than routine successes I might well have ended there, because after all the analysis of managerial mechanisms, one must fall back on that overriding principle.

Presented before The American Institute of Chemists, New York Section meeting, January 26, 1945, under the title "The Chemist in Management."



Searles Lake, with American Potash & Chemical Corp. plant in foreground

LITHIUM from Searles Lake

LITHIUM CONCENTRATES are now being produced from Searles Lake brine in a new plant of American Potash & Chemical Corp., potential capacity of which is considerably in excess of prewar lithium requirements

SEARLES LAKE, located on the edge of the Mojave Desert in California, has long been a source of borax, potash, soda ash, sodium sulfate, bromine and other chemicals. Only recently, however, has it been exploited for its lithium values. Previously, all lithium compounds were produced from various complex lithium ores, but since 1938 the production of lithium compounds in the United States has been substantially increased by the entry of the American Potash & Chemical Corporation of Trona, California, into the ranks of the primary producers.

Searles Lake is in reality a desert salt-pan or playa. Following infrequent rains it may be covered with a few inches of water, but during most of the year the salt surface is dry and will easily support the weight of heavy vehicles. For the most part, the "lake" consists of a solid body of crystalline salts extending to a depth of sixty to ninety feet. The exposed surface of the main salt body covers an area of approximately twelve square miles, while the extent of the total known deposit is about thirty square miles, containing possibly 100,000,000 tons of alkali salts per square mile.

The porosity or proportion of voids in the salt body has been variously estimated at 25 to 45 per cent. These voids are filled with a saturated brine. Wells drilled into the deposit extract this brine at the rate of about 17,500 tons per day as raw material for the production of the various chemicals produced at the Trona plant.

Searles Lake brine has long been known to carry small amounts of lithium in solution, but it was not until 1938 that a limited recovery of a new crude lithium compound was commenced at the plant of the American Potash & Chemical Corporation as an incidental co-product of other operations. This lithium "concentrate," having a composition approximately represented by the formula Li_2NaPO_4, has found a ready market due to its extremely high lithium content (19–21% Li_2O).

The brine entering the Trona plant contains approximately two tons of Li_2O per day equivalent to ten tons of the compound Li_2NaPO_4. Not all of the material is available for recovery, considerable quantities being inevitably lost in the general plant operations and through occlusion as a trace impurity in the various plant products which aggregate over 450,000 tons annually. However, early in 1942, when wartime needs for lithium were found greatly to exceed the domestic output capacity, an extensive research project was initiated by the American Potash & Chemical Corporation aimed at a substantially increased recovery of this material. As a result of this work a new process was developed and tried out on a pilot plant scale during 1943. A novel lithium concentrate recovery plant was built early in 1944 and placed in successful operation during the past summer. This plant has quadrupled the original production and has a potential capacity considerably in excess of pre-war world lithium requirements.

INSECTICIDES and FUNGICIDES—

Current Supply and Outlook

by JOHN A. RODDA, Chief, Insecticides and Fungicides Unit,
Chemicals Bureau, War Production Board

SUPPLIES OF MATERIALS for insecticides and fungicides vary with the fortunes of war, the exigencies of munitions production, and importations. Presented here are statistics on these war-scarce materials—their supply and their allocation to essential needs of agriculture and the armed forces.

CONTACT of our troops with malaria and typhus-ridden areas has brought home dramatically to the average American the importance of insecticides. The outcome of several military encounters throughout history has been decided, not by guns nor superior strategy but by the ravages of disease.

It is impossible, of course, to determine exactly what share of credit for our successes in the Mediterranean and Southwest Pacific is due to DDT and the aerosol bomb, but it is certain that their contribution was large.

The emphasis placed on these "war babies," however, has in some quarters minimized the essentiality of other materials which are vitally required.

There is no "miracle" insecticide which will control every type of insect, and there is no single fungicide which will eliminate or prevent every type of plant disease. Many types of both must be used specifically to combat the constant threat of disease to man as well as animal and plant life.

A great host of individuals is contributing daily to the accumulated knowledge of insect control. Entomologists and plant pathologists study life histories of insects and diseases and make recommendations to prevent insect devastations; chemists compound mixtures designed to eliminate insects and diseases without causing plant injury; engineers design equipment for proper application of the various compounds; plant-breeders constantly endeavor to develop varieties or strains of plants which are resistant to insects and diseases. Colleges and universities offer special training courses; and literature covering every phase in the control of insects and diseases is widely distributed.

The economical use of manpower in preparing soils, in applying fertilizers, in planting, in the use of seed inoculants and disinfectants and in proper cultivation is subject to numerous factors. Even then crops might still be partially or completely destroyed unless insecticides and fungicides are properly used. These materials are, therefore, an important part of our war effort.

Many raw materials used in the production of insecticides and fungicides are in short supply because of a cut-off in imports and increased usage and are therefore subject to allocation by the War Production Board. For the past three years we have been struggling with raw material shortages, with allocations and directives, with interim allocations and stockpiles.

We are greatly indebted to the chemical industry for finding the means to conserve the already limited supplies through skillful utilization and distribution or through substitution, so that despite these restrictions, great strides have been made in the control of insects and diseases.

Arsenic

Because of restricted imports and decreased gold mining, arsenic was placed under allocation by WPB May 22, 1942, and is still subject to M-300 Schedule 46. This commodity is principally a by-product of copper and lead smelting, and in order to augment existing supplies, authority was obtained in 1943 to treat rich ores. Furthermore, arrangements were made through the Metals Reserve Company to re-open several domestic mines and to import low grade crude ores from Peru. Currently about 85% of the available arsenic supplies are allocated to domestic agriculture, and the balance is spread between exports, pharmaceuticals, railroad weedkillers, dyestuffs, gas purification, glass manufacture and miscellaneous uses.

The War Food Administration, as claimant for domestic agriculture, has requested that WPB schedule the production of 90,000,000 lbs. of lead arsenate

The effect of insecticides on various flowers is studied in the greenhouse of a pest control laboratory. A good insecticide must not only control pests, but be harmless to the plant.

Common house flies are reared carefully in this "fly farm." Evaluation of insecticides, utilizing these insects as controls, has been standardized in the Peet-Grady test.

(about 50% of which is required for the control of apple insects); 28,000,000 lbs. of calcium arsenate (this figure is low on account of carryover stocks in the Cotton South) and 1,700,000 lbs. of paris green. In addition, a contingency of arsenic has been established for herbicides, several minor insecticides, and a reserve for potentially serious insect infestations.

The Foreign Economic Administration has requested WPB to schedule the production of 4,300,000 lbs. of lead arsenate, 3,038,000 lbs. of calcium arsenate and 1,860,000 lbs. of paris green (in addition to its needs for white arsenic as such).

While arsenic production is approximately 20% less than 1944, it is possible, because of revisions in the programs of the various claimants, to assure adequate supplies of arsenicals.

Recently, a critical shortage occurred in the supply of lead. Only 60% of 1944 requirements could be approved by the Lead, Tin and Zinc Division; but the Chemicals Bureau of WPB has issued Order No. M-384 designed to provide for specific uses. In this way 90% of 1944 production of lead arsenate has been authorized.

Copper

Copper chemicals were placed under allocation October 1, 1942, and are still subject to WPB Order M-300 Schedule 47. Copper sulfate, one of the most widely used fungicides, is prepared from scrap copper and sulfuric acid and is also a by-product in the electrolytic refining of copper. It is specific for many fruit and vegetable crops and, as such, cannot be replaced by sulphur or any other compound. Certain seeds must be treated with copper carbonate or cuprous oxide; and soils deficient in copper require the application of copper salts.

Approximately 100,000,000 lbs. of copper sulfate, 300,000 lbs. of cuprous oxide, 500,000 lbs. of copper carbonate and 200,000 lbs. of copper oxychloride are required for agriculture annually.

About 75,000,000 lbs. of copper sulfate are required by Central and South American countries for agricultural, mining and industrial purposes (85% is required for bananas).

With wartime shortages of cuprous oxide (due to the need of this material for anti-fouling paints), even greater emphasis is being placed on the needs for insoluble coppers. This is a combination having a higher percentage of copper than the normal blue vitriol of general use and is not as readily washed off plant surfaces.

Other Inorganic Materials

Cryolite, available in natural form from Greenland and in synthetic form (reaction between sodium and aluminum fluorides), is used extensively as a flux in aluminum manufacture but also has a wide use in agriculture for the control of fruit and vegetable insects. It has served as a partially suitable substitute for lead arsenate, rotenone and pyrethrum. About 8,000,000 lbs. are utilized for this purpose annually.

Sodium fluoride, produced from aqueous hydrofluoric acid, is used as an ingredient in cockroach powders and as an exterminator of poultry insects. Approximately 3,500,000 lbs. of this commodity are required annually for these purposes.

Sodium fluosilicate, manufactured from the acid fumes recovered as a by-product in the manufacture of superphosphates, is used in poison baits and as a substitute for sodium arsenite to the extent of about 3,000,000 lbs. per year.

Mercury for insect control is used in the forms of corrosive sublimate and calomel whereas organic mercurials are utilized in the treatment of turfs and seeds for fungicidal purposes. But the requirements for mercurials in agriculture are very limited; more substantial quantities are used for pharmaceuticals, munitions, electrical equipment and anti-fouling paints.

Rotenone

Rotenone was placed under allocation January 23, 1943, and is still subject to WPB Order M-300 Schedule 49. End uses for domestic agriculture are determined by the War Food Administration and are limited to those considered most essential.

Rotenone insecticides are manufactured from certain tropical roots referred to commercially as Derris, Cube, Barbasco, Timbo, etc. Since rotenone is the principal ether extractive of the roots, the common practice has been to buy and sell this latter commodity on the basis of rotenone content; but the roots normally contain other ether extractives which contribute definite toxic value. These include tephrosin, toxicarol and deguelin. Prior to Pearl Harbor, more than 60% of the United States supplies were imported from the Pacific area. Current supplies are obtained solely from Central and South America, about 90% coming from Peru. Approximately 4,423,000 lbs. of 5% rotenone were received in the 1944-45 season of which 3,500,000 lbs. were allocated to the United States and 860,000 lbs. to the United Kingdom and Canada.

Nicotine

Certain varieties of leaf tobacco, waste and stems are utilized in the production of nicotine. There are four producers, but because of raw material shortages, only two are currently in operation. Last year, as in previous seasons, Commodity Credit Corporation procured about 22 million pounds of leaf tobacco which was diverted to nicotine production.

Efforts are being made to obtain leaf tobacco for this season to supplement supplies of tobacco stems. The supply situation at present remains critical.

Approximately 1,245,000 lbs. of 100% nicotine are required annually for domestic purposes. It is used primarily against insects attacking fruits and vegetables. It is also used for the control of poultry insects and as an anthelmintic for sheep.

Pyrethrum

Pyrethrum was placed under allocation by WPB July 1, 1942, and it is now subject to WPB Order M-300 Schedule 48.

Pyrethrum in normal times was widely used as an ingredient in household and livestock insecticides, and substantial quantities were used for the control of insects attacking food crops. The normal consumption of this material in the United States was approximately 11,000,000 lbs. (based on high test material). The

sources of supply for the most part have been British East Africa, Brazil, and Belgium Congo. Prior to 1939, rather large quantities were available from Japan. Preparations for Pearl Harbor and the war with the United States in 1939 undoubtedly caused the exportation of pyrethrum from Japan to be curtailed.

Fortunately, for the United States and Great Britain, the British colonial officials started the large scale production of pyrethrum in Kenya, Tanganyika, and Uganda in the late thirties. By 1939 and 1940 the production of these three colonies approximated 12 million pounds of high-test flowers per year.

When the military desired a material which was relatively non-toxic and quick in knockdown, they naturally turned to pyrethrum. Because of a lack of rain in British East Africa during 1941 and 1942, the pyrethrum crop suffered; the amount of pyrethrum available here in the United States during the latter part of 1942 and early 1943 was extremely short of actual military needs. For use in malarial areas throughout the world the Army developed a device which has become popularly known as the aerosol bomb. This bomb consists of a solution of purified pyrethrum extract containing 20% pyrethins and sesame oil in Freon-12. The advantages of this type of device lie in its compactness, the facility with which it can be transported, and its effectiveness in the destruction of most flying insects such as the mosquitoes which carry malaria and yellow fever.

In Italy, French North Africa and the Middle East, the Army was confronted with the problem of typhus. This disease is carried by body lice which are, in turn, probably carried by rodents and similar animals. The problems in the control of both the louse and the mosquito could best be solved by the use of a material such as pyrethrum. In preparing for the invasion of North Africa and eventually Sicily and Italy, the problem of an effective louse powder was of paramount importance in military planning. There was not sufficient pyrethrum to provide material for both louse powder and the aerosol bomb, and accordingly, in June, 1943, the Army stopped the use of pyrethrum in the louse powder and recommended in its stead a 10% mixture of DDT and inert diluent. In this way all available pyrethrum was diverted for use in the aerosol program from then on.

In the manufacture of purified pyrethrum extract, there are small amounts of residual waxes and fats which are returned in a form which cannot be used in the military program. These quantities of material are diverted for other than military use, for those civilian and agricultural uses which are essential and for which no adequate substitute is available. The War Food Administration sets up the approved agricultural end uses for the limited quantities of material which are available. The civilian allotments of this type of material go for the most part into uses where toxic materials such as the arsenicals and fluorides cannot be used. Incidentally, the aerosol bomb now contains a small percentage of DDT to add to the effectiveness of the pyrethrum. In the present formulation of the bomb the pyrethrum gives the necessary knockdown while the DDT contributes to the residual effectiveness of the insecticide.

Pyrethrum was formerly imported from British East Africa, Brazil, Belgian Congo, and Japan. Fortunately, British colonial officials started production in other colonies in the thirties.

Synergistic Action

Webster has defined synergism as "co-operative action of discrete agencies such that the total effect is greater than the sum of the two effects taken independently; the opposite of antagonism, as in the action of mixtures of certain drugs."

In the early thirties the insecticide industry was made aware of the phenomenon of synergism. The first example was the addition of a small amount of rotenone to a pyrethrum-kerosene insecticide; this boosted the toxicity of the finished product to a degree greater than if its effect was merely additive. The first commercial development of a synergist was the addition of IN–930, which is the popular name for *iso*butylundecylenamide, to a kerosene-pyrethrum mixture. There are many other combinations of chemicals with active insecticidal ingredients which give a synergistic effect. Many chemical companies are today engaged in research attempting to find additional synergistics. Some of those which have shown promise belong to the class of benzamides; others are materials found in the sesame seed; the alkaloid found in black pepper has also shown some synergistic properties.

Oils and Diluents

Pine oil is useful in insecticides used for horticultural purposes and in cattle sprays. It is also an effective disinfectant. Besides its toxic action, pine oil has characteristics which in agricultural sprays contribute emulsifying properties.

Vegetable oils is a large group of oils which are useful to growers. Cottonseed oil, and soybean oil used with cuprous oxide offer an effective treatment for blue mold disease on tobacco. Oleic acid (red oil) is a good emulsifier.

Actual figures regarding quantities of oils used are not readily available but a rough estimate would probably indicate that about 75,000,000 gallons of petroleum oils and about 1,400,000 gallons of pine oil are used annually for insecticide purposes.

There are numerous types of materials used as inert diluents for dust insecticides,

but tonnage-consumption figures are not available.

A partial list of these materials would include pyrophyllite, diatomaceous earth, talc, bentonite, silica, walnut shell flour, kaolin, gypsum, and lime.

Lime is used in the manufacture of calcium arsenate, lime-sulfur and copper-lime dusts. It is also used in the preparation of sprays and dusts such as Bordeaux mixture. The grade of lime most generally used is referred to as hydrated lime (high-calcium). Approximately 400,000,000 pounds are used annually.

Pyrophyllite is mined principally in North Carolina and used extensively in the eastern part of the country. Large quantities are required by the armed forces, at times causing a shortage in supplies for other purposes, but agricultural uses have a high priority.

Synthetic Chemicals

In the early thirties many of the large chemical and insecticidal manufacturers in the United States began the systematic examination of synthetic organic compounds in search of those possessing insecticidal and fungicidal value. Because the common house fly can be reared successfully throughout the year and because methods for evaluating insecticides, using the fly as a test insect, have been standardized through the Peet-Grady test, compounds having insecticidal value have for the most part been tested as fly sprays. More than 1300 compounds have been mentioned in over 77 patents issued between January 1938 and June 1941 as potential substitutes for pyrethrum as an ingredient of fly sprays.

An early-discovered substitute for pyrethrum is the general class of aliphatic thiocyanates. Among these is the type of insecticidal raw material illustrated by *iso*bornyl thiocyanoacetate. Several derivatives of aniline, acetamide, benzoic acid, ethane, ethanol, ether, and many other compounds have been developed.

The first synthetic organic compounds tested as stomach poisons for insects were dye and dye intermediates, originally manufactured for moth-proofing wool. Some of these were of the "Eulan" series which, for the most part, were complicated aromatic compounds. Although moth-proofing compounds in general act as stomach poisons to clothes-eating insects, a large field remains to be explored for possible use of these materials as protection for food crops.

Until recently entomologists and plant pathologists depended exclusively upon such materials as copper, sulphur, mercury, and zinc for controlling fungicidal and bacterial injuries to growing plants. It has been only recently that organic fungicides—with the exception of formaldehyde, carbon bisulfide and a few others—have been used as seed disinfectants. The successful introduction of tetrachloroquinone as a seed disinfectant opened up this field to the organic chemists. Several new compounds have been produced commercially for such use, the most important of which are the carbamates. At the present time Fermate, arason, dithane, are but a few of the compounds of this series which are used.

CHECKLIST FOR NEW INSECTICIDES

BEFORE placing a new insecticide on the market, manufacturers will save themselves much time, money and trouble, according to Dr. F. C. Bishopp of the Bureau of Entomology and Plant Quarantine, if they can answer fully and satisfactorily the following questions about their product:

1. How effective is it for killing insects?
2. What is its toxicity to higher animals and man, by contact and by oral ingestion?
3. What is its toxicity to plants and the soil?
4. Can it be compounded in such a way as to make it satisfactory for application under the many and diverse conditions under which an insecticide is used?
5. Is it compatible with the common fungicides? In many cases it is desirable to compound an insecticide with materials to control plant diseases.
6. Can it be applied with standard equipment? Under wartime conditions this is especially important, since new methods and equipment cannot easily be developed.
7. What are the limits of its usefulness? The universal insecticide is just about in the same class as the universal solvent.

DDT

About 1874, Othmar Zeidler, a German graduate student, synthesized dichlorodiphenyltrichloroethane. Neither Zeidler nor the scientific world was aware of its significance; the new compound was accorded only six lines of notation in the German literature.

Several years ago Paul Muller, a chemist with the Geigy Company in Switzerland, again synthesized the compound and found that, combined with a carrier, it provided an effective insecticidal composition. In 1939 the potato crop in Switzerland was threatened by an infestation of Colorado potato beetles. Geigy made some of the material available to the Swiss agricultural officials, and DDT was on its way to fame and fortune. It is reported that 150-200 tons of this material were used in Switzerland in 1941.

In September, 1942, a small sample of this material was given to a representative of the WFA in Washington as a compound of insecticidal interest. A pound sample was sent to the Bureau of Entomology and Plant Quarantine in November, 1942, for analysis and laboratory experimentation. By April 22, 1943, a total of 7 lbs. of material was either imported or made in this country.

With the combined effort of the scientists in the above bureau, OSRD, the Surgeon General's Office of the Army, and other interested scientific bodies, an "all out" effort was inaugurated to determine the full extent of the efficacy of DDT and DDT-insecticide compositions against pests affecting the military. During June, 1943, the Army gave tentative approval to DDT-pyrophyllite mixture as a body louse powder in view of the increasingly critical scarcity of pyrethrum, which was needed for the aerosol program.

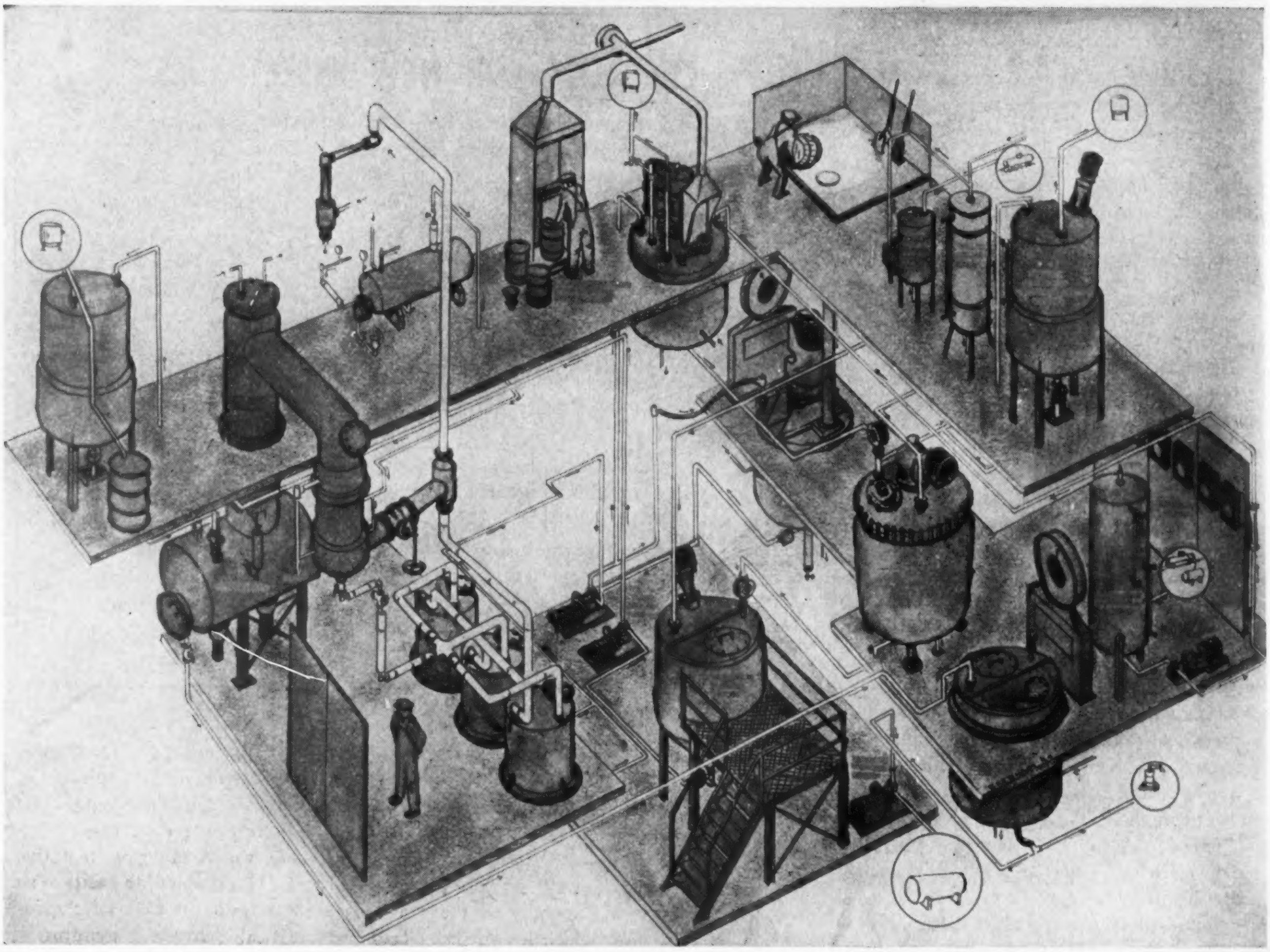
Late in September, WPB was asked by the Army and Navy to provide additional facilities for the production of DDT. Originally, two plants were approved; but in December two more were planned, and in May, 1944, six additional producers were included in the program. Thirteen manufacturers produced more than 2,000,000 lbs. in January, 1945, compared to 1,000 lbs. in April, 1943.

Repellents

As a companion to the aerosol bomb, the armed services have developed insect repellents to repel flying insects on the general theory that a bug repelled is a bug that won't bite. Some of the more successful of these are indalone (butyl mesityl oxide oxalate), dimethyl phthalate, and Rutger's 612 (ethyl hexanediol).

These briefly described commodities form only a portion of the vast arsenal of ammunition vitally necessary to combat the destructive insects and diseases which attack everything connected with human life. Crops, livestock, stored foods, building structures, clothing, rugs, upholstery, and textiles are constantly exposed to attack. Damage exceeding three billion dollars is incurred each year.

The contribution made by industry in the development of materials utilized in the preparation of insecticides and fungicides has been an important part of the war effort.



Three-Dimensional Drawings Aid PLANT LAYOUT Visualization

by H. W. BRINKERHOFF, Manager, Technical Data Service
Chemical Division, The B. F. Goodrich Co., Cleveland, O.

B. F. GOODRICH COMPANY'S Chemical Division keeps a chemical engineer-artist busy full time making isometric visualizations of new plant layouts and alterations. Though less flexible than actual models, the three-dimensional sketches have many of the same advantages and in addition are cheaper, quicker to make, and more convenient to handle and store.

CHEMICAL ENGINEERING is one thing and illustrating is another, and it's seldom that the twain do meet, but the Chemical Division of B. F. Goodrich Co. has succeeded in mating these strangers in an unusual but valuable union. Isometric drawings, executed to scale and in considerable detail, are used to give clear, factual engineer's-eye views of process manufacturing plans which otherwise would be a confusing welter of blue prints.

The three-dimensional drawings are prepared by E. E. Ketcham, chemical engineer and artist of the Chemical Division technical staff. They have proved invaluable for a number of purposes. For instance, a complete book has been compiled showing all equipment, positions of operators, locations of valves and controls, and the different operating levels of the division's entire Geon polyvinyl resin plant at Louisville, Kentucky. In this job the flow of materials is indicated by vari-colored pipelines, and the books have been used as process instruction sheets for training new techincal personnel and for acquainting non-technical members of management with the functioning of the plant.

Aid in Locating Valves and Controls

The drawings have other uses, too. When plant additions and new construction plans have reached the specification point, Ketcham's work gives a three-dimensional view of the proposed construction complete with operators at their stations, and from these details engineers can correct the locations of valves for better convenience, ascertain the visibility and utility of control panels and determine such things as the proper placement of storage areas and the most efficient flow of raw materials. At this stage of planning, an isometric drawing often saves valuable time and money by bringing to light necessary process changes or equipment relocation before construction actually proceeds.

But the illustration technique has its post-construction uses, too. Once not long ago the technical supervision of the division requested an appropriation to

replace a piece of valuable equipment. The bug in the deal was the difficulty of explaining to a group of semi-technical executives just why the equipment must be replaced. "Does it work all right now?" "Yes, it works, but it's costing us money to keep it in operation." "Why?" "Well, the equipment must be cleaned occasionally, and because of its location the job is too difficult. It should be redesigned and rebuilt." That was tough to visualize, so Ketcham illustrated the problem. No more questions were asked. The job was approved.

Beyond the obvious uses of the drawings for technical purposes, they are useful, too, in the broader fields of safety and employee relations. By carefully examining a drawing of a new plant or process, engineers can determine where safety hazards may appear and thus remove the causes before the trouble starts. And by tracing each manual operation of a process on the drawing it is often possible to eliminate uncomfortable, obnoxious or excessively tiring actions by the operators, thus making the jobs as pleasant as possible.

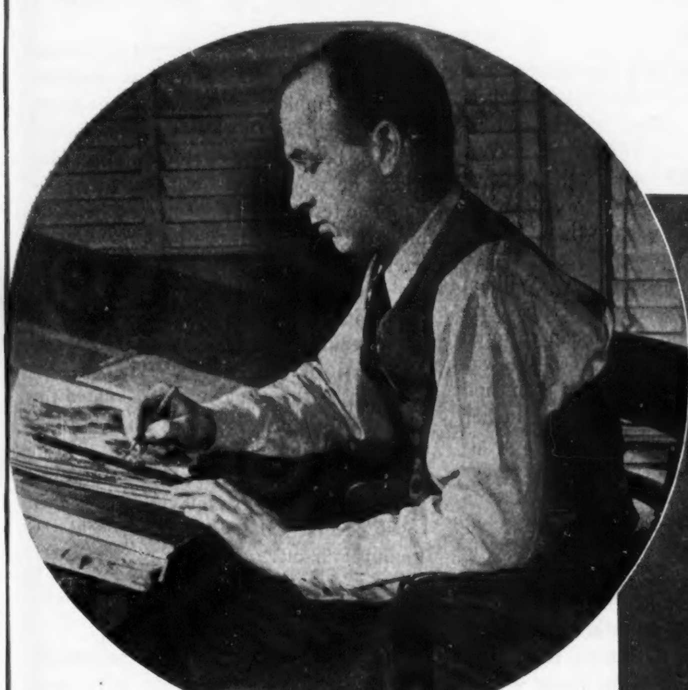
Isometric drawings have a very real engineering value in some instances. Recently Chemical Division engineers have experimented with the use of these drawings in place of piping layouts for relatively simple installations. By following the drawing, a pipefitter can see exactly where the piping goes, how it is to be used, and what he is likely to run into in the way of odd bends, unions and obstructions. Ordinarily, piping layouts take a considerable amount of time to prepare and almost as long to decipher intelligently.

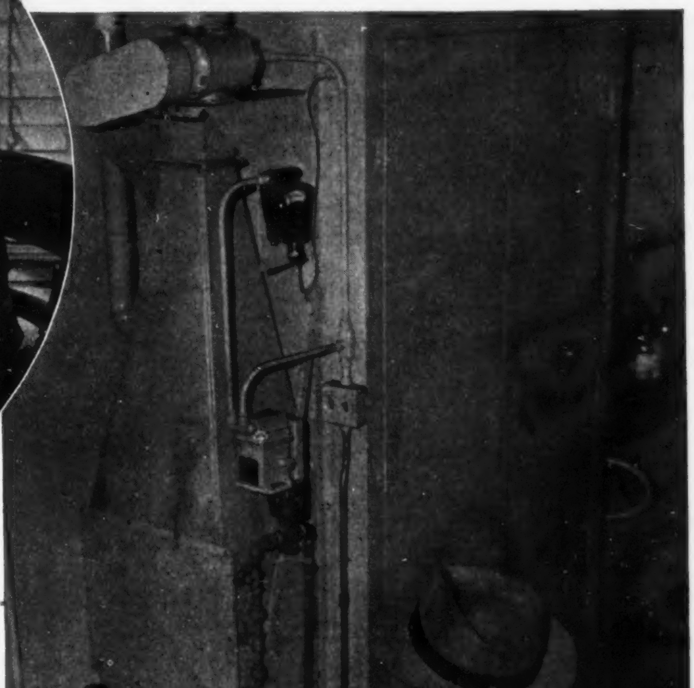
Advantages Over Models

The Chemical Division has occasionally used models as illustrations, especially in showing new plant construction. These were made to scale of transparent plastic and sectionalized so that whole units could be removed or shifted. But for routine visualization, models were too expensive and took too long to make. Besides, models cannot be bound in compact book form for ready reference, and the maze of piping necessary to process operations was virtually impossible to duplicate.

Ketcham uses a very simple method of working. In preparing drawings of proposed construction or process changes he sketches directly from blueprints, translating the details into a three-dimensional overall picture. Working carefully with a sketch pad he follows every pipe, locates every valve, draws each piece of equipment and traces the process through every level. He roughs out the flow, determines the perspective necessary and arrives at the proper proportions. This rough is then filled in in detail—piping, equipment, controls take their places. The whole job is rechecked for accuracy, and then a finished drawing is made.

When he makes drawings of existing units for use as instruction sheets or as visualizations for plant changes, Ketcham works right out in the plant with a pencil and tracing pad, following the process from floor to floor or building to building. On his drawing board these rough sketches take form as comprehensive illustrations of flow and equipment.





The idea behind the three-dimensional drawings was conceived by Dr. Frank K. Schoenfeld, technical director of the B. F. Goodrich Chemical Division. The talent on the job is provided by (1) E. E. Ketcham, University of Michigan, '37 Ch.E., and (2) E. E. Ketcham, Carnegie Institute of Technology art school. Ketcham, shown above at his drawing board and at right sketching in one of the Goodrich plants, manages to combine his alter-egos with a minimum of fuss. He complains, mildly, that Ketcham, the engineer, must sometimes bludgeon Ketcham, the artist, into resisting the inclination to go all out for art, but usually the engineer wins.

Ketcham works with standard drafting materials, plus crayon, air brush and water colors. The work is tedious but interesting, he says, and just to keep himself out of mischief he goes to school two nights a week—art school.

More Higher Court Decisions Involving Chemicals

LEO T. PARKER, Attorney at Law, Cincinnati, Ohio

DURING THE PAST FEW MONTHS the higher courts have rendered decisions which, in one way or another, concern a majority of manufacturers and sellers of chemicals. Many of these modern decisions reverse older law. In this article, some of the most noteworthy of the recent decisions involving chemicals are reviewed.

Sales to City, County or State

ALL PERSONS and corporations selling chemicals, or other merchandise, to any public institution do so at their own risk. They must know that the one who makes the purchase is legally and lawfully authorized to do so.

For illustration, in Missouri-Kansas Chemical Company v. Christian County, 180 S. W. (2d) 735, it was disclosed that a chemical company sued a county to recover payment of several hundred dollars for soap and disinfectant sold to the county for use in the courthouse and almshouse.

The chemical company contended that it was entitled to judgment for the full amount because the county budget law does not affect its transactions with Christian County.

During the trial the county authorities contended that the county was not liable although the materials were received and used by the county. The testimony showed that a state law provides that valid contracts of this nature must be made by a majority of the judges of the county court.

The chemical company proved that the contracts of purchase were signed by the courthouse janitor. Furthermore, the testimony indicated that the presiding judge had authorized the janitor to make the purchases. Notwithstanding this testimony the higher court refused to hold the chemical company entitled to recover payment for the merchandise purchased and used by the county. This court said:

"Under the circumstances the janitor was not the agent of the county and his purchases did not bind the county. The same is true of the presiding judge. He likewise was not the agent of the county, nor did he have authority in his individual capacity as presiding judge to make a contract on behalf of the county . . . There is no record of the county court authorizing the purchase of the materials. A county court is a court of record and speaks only through its records; verbal understandings with county judges are not valid."

Proper Labels

MODERN HIGHER COURTS consistently hold that a manufacturer who falsely labels a product as safe when it is dangerous is liable to the person injured. However, the higher court will consider the "whole" label and not merely a few words when deciding whether a chemical is falsely labeled.

For example, in Bender v. William Cooper and Nephews, Inc., 55 N. E. (2d) 94, it was shown that a woman suffered serious injuries to her eye when she was pouring a disinfectant into a can and some of the disinfectant splashed in her eye. She sued the manufacturer and alleged that she was entitled to recover heavy damages because the can had a label thereon which stated that the contents were "safe and non-irritating." The higher court refused to hold the manufacturer liable, saying:

"The weakness of plaintiff's case is that she takes from the label a few words and bases her claim upon these words, ignoring all other statements on the label."

Also, see Carmen v. Eli Lilly and Company, 32 N. E. (2d) 729, where the higher court held that the decedent was bound to consider the pamphlet accompanying the package as a whole, and not single out and rely upon a single word or paragraph to the exclusion of the rest.

On the other hand, see Cahill v. Inecto, Inc., 203 N. Y. S. 1, where the manufacturer of a hair dye advertised it and represented to the general public that it was suitable for use as a hair dye, and for application to the head as such.

A person used the hair dye as directed and a few hours after applying it serious consequences developed. The seller was held liable. And again in Kolberg, 93 Cal. App. 609, it was held that the manufacturer of a chemical inherently dangerous to orange trees was liable for injuries to an orchard from the use of such compound, although purchased through a middleman.

Safety Statutes Violated

EMPLOYERS who violate state safety statutes automatically become liable for injuries to employes who may sue for damages instead of applying for compensation under the State Workmen's Compensation Act.

For illustration, in Lockhart v. Kansas City, 175 S. W. (2d) 814, an employe sued his employer for $50,000 damages for personal injuries and disease, claimed to have been caused by dusty conditions where he worked in the chemical building. The testimony proved that substances prepared and used in the plant caused deleterious and poisonous dust in the building in which the employe worked so that it was inhaled by him in dangerous quantities which caused permanent incapacitating injuries and disease. The employe proved that the employer had violated the state health and safety statutes applicable generally to employers.

Although the lower court refused to allow the employe damages, the higher court reversed the verdict and held the employer liable.

New Ceiling Price Law

THE HIGHER COURTS have consistently held all "ceiling" or frozen price laws and regulations valid and effective. However, recently the higher courts have rendered new decisions of interest.

For example, in Buckley v. Bowles, 143 Fed. (2d) 877, it was shown that a manufacturer ordered printing of a new catalogue quoting higher prices on his products. However, publication of the catalogue was delayed.

In the meantime the manufacturer contracted to sell certain products to a seller at the higher prices listed in the new catalogue, because actually he was losing money selling at the old catalogue prices.

On May 11, 1942, the prices became subject to the General Maximum Price Regulation, which had been issued on April 28, 1942. This regulation fixed as the maximum price the highest price

which the manufacturer had charged for the same commodity delivered by him in March, 1942. It was the manufacturer's misfortune that his price increases listed in the new catalogue, and which went into effect for deliveries on and after April 1, just missed coming within the deadline set by the regulation.

The manufacturer argued that he should not be compelled to sell his products at the losing price of March, 1942, because he intended publicly to increase his prices to all purchasers if publication of the new catalogue had not been delayed due to a trade-mark litigation.

However, the higher court held the manufacturer must sell his products at the old prices.

On the other hand, see the new case of Bowles, 145 Fed. Rep. 482. In this case a manufacturer sold his product during March, 1942, to all customers but one for 60 cents per hundred pounds. In January, 1942, he made a contract with a purchaser to sell the product at $1.50 per hundred pounds. The manufacturer did *not* deliver any merchandise to this purchaser during March, 1942, but the higher court held that his ceiling price was established at $1.50 per hundred pounds, because this purchaser had a right to make purchases during March at this higher price.

Also, see Taylor, 150 Pac. (2d) 839, where the higher court held that if a state law specifies that merchandise, owned by the state, must be sold to the highest bidder at public auction, the sale is legal although the highest bidder pays more than the ceiling price established by the O.P.A.

Lease Not Forfeited

MODERN HIGHER COURTS consistently hold that the only conceivable benefit which a forfeiture of a lease would confer *upon* a landlord is that he might, if relieved of the present tenant, be able to lease the premises at a larger rental. Therefore, the courts will not cancel a lease unless the contract between the landlord and tenant clearly expresses this intention.

For example, in Clerc Chemical Company v. Sanford, 142 Fed. Rep. (2d) 672, it was shown that a chemical company leased a building to another chemical company. The lease contract contained a clause to the effect that if the Purax Chemical Products Company shall be adjudicated a bankrupt, then and in that event the lessor (landlord) shall have the option to terminate this lease as of the tenth day after the adjudication of bankruptcy. Later the lessee chemical company assigned its lease to the Clerc Chemical Company which became bank-

An idea of the size of Kobuta is afforded by this partial view of the plant

KOBUTA'S BYPRODUCTS

MORE than butadiene and styrene—of which it produces about one-seventh of the nation's total supply—is coming from Rubber Reserve's huge 200-acre plant at Kobuta, near Pittsburgh, Pa., according to Dan. M. Rugg, vice-president, Koppers Co. Butadiene Division, which operates the plant.

In addition to the two synthetic rubber base materials, a number of other chemicals are produced from the byproduct oils and gases of butadiene manufacture. Ether, recovered from the oils, is being used to replace ethyl alcohol in the production of styrene. A plant now under construction at Kobuta will recover ethylene gas. This also will be used in producing styrene and will replace more alcohol. This plant is expected to be placed in operation in April of this year. "With the recovered ethylene gas and ether being substituted for ethyl alcohol, Kobuta will be self-sufficient insofar as the alcohol requirements for styrene are concerned," Mr. Rugg said, "and, it is estimated nearly 10,000,000 gallons of alcohol will be saved."

Toluene, in the amount of some 50,000 to 60,000 gallons a month, is being currently recovered from the production of styrene at Kobuta. This goes into the nation's TNT and aviation gasoline. There also has been a recovery of secondary butylbenzene, which has gone to various oil companies for blending in aviation gasoline. Also recovered have been large quantities of polyethylbenzene. This has been supplied those companies using the alkylation process, as feed stock for production of ethylbenzene.

During the period from June through November, 1944, some 16,000,000 pounds of ethylbenzene were produced at Kobuta for use in the nation's aviation gasoline program. At present, due to a shortage of benzol, Kobuta is producing only enough ethylbenzene for its own styrene requirements.

Other chemicals, such as butanol, and other gases are being experimentally produced at Kobuta, Mr. Rugg said. For some of these the uses and markets are known. Others are entirely new chemicals, the end uses of which have yet to be determined.

Some quantities of dicyclopentadiene and xylene, the latter used as a solvent, also are being produced at Kobuta during the manufacture of butadiene and styrene. These have been supplied to various chemical companies.

The residual by-product oils and gases, after recovery of the chemicals named above, are being used as fuel in the process furnaces at Kobuta, Mr. Rugg said. He added that, as research disclosed commercial possibilities for those chemicals so far recovered, or resulted in the discovery of other chemicals, together with uses and markets for the same, still further use would be made of these by-product oils and gases.

rupt. The question presented the court was whether the above clause in the lease contract entitled the landlord to cancel the lease with respect to the Clerc Chemical Company, the assignee. The lower court held in the negative since the original lease contract did not state that the contract would be cancelled if the asignee became bankrupt. This court also held that the lease was part of the bankrupt's estate and to be disposed of as such. The Reilly Tar and Chemical Corporation, appealed to the higher court which, however, approved the verdict.

State Law Must Specify Liability

Obviously, no manufacturer is liable in damages for unusual occurrences, unless a valid state law defines the liability.

For illustration, in Sterling Aluminum Products, Inc., v. Shell Oil Company, 140 Fed. (2d) 801, it was shown that a purchaser informed the manufacturer that he desired a penetrative fluid that was non-corrosive, non-inflammable and non-explosive, for testing automobile motor blocks for cracks. The manufacturer supplied a chemical product which, when being used, effected death of an employe occasioned by the fact that his clothing had caught fire and burned him to death when a freeze plug blew out of a fluid-filled motor block and shattered an electric light globe which ignited the fluid.

The employe's employer paid compensation insurance amounting to $4,000 to the employe's dependents and then sued the chemical manufacturer to recover this amount.

The higher court refused to hold the manufacturer liable to the employe's employer because no state law specified that manufacturers or sellers are liable in damages for injuries sustained under the above circumstances.

Patent Not Allowed

Modern higher courts have adopted the rule that when an inventor, or patentee, sues to compel the issuance of a patent, the burden is on the inventor to show that he is entitled to more protection than the Patent Office gave him. His failure to conform with this rule will result in an unfavorable verdict.

For illustration, in Monsanto Chemical Company v. Coe, 145 Fed. (2d) 18, it was shown that a chemical company sued the Commissioner of Patents, to compel the issuance of a patent to cover the process of adding to hard water certain specifically named chemicals called triphosphates and tetraphosphates in order to soften it. In refusing to hold in favor of the chemical company, the higher court said:

"The only real problem is to prevent patents from becoming a monopoly on technical progress in defiance of the Constitution. It is a discovery of a portion of the chemistry of softening water."

Basic Patent Rejected

No inventor is entitled to a basic claim, unless he proves that his invention is new in every respect.

For example, in Application of Oppenauer, 143 Fed. (2d) 974, it was shown that an inventor filed an application for a patent on a process for manufacturing "polycyclic ketones which comprises subjecting an unsaturated polycyclic alcohol in which it is theoretically possible for at least one hydroxyl group to be replaced by a keto group to the action of an excess of an organic compound selected from the group consisting of aldehydes and ketones in the presence of an alcoholate selected from a class consisting of the tertiary aluminum and chloro-magnesium alcoholates."

The higher court held this claim void and gave as its reason that a process for oxidizing unsaturated polycyclic alcohols is too broad because all unsaturated polycyclic alcohols mentioned in the specification and disclosures were members of a single class of polycyclic alcohols.

Trade-Mark Infringed

If a trade-mark is confusing or dangerous to the buying public it cannot be registered in the United States Patent Office.

See Campbell Products, Inc., v. John Wyeth and Bro., Inc., 143 Fed. Rep. (2d) 977. The facts of this case are that a company registered in the United States Patent Office the trade-mark "Alulotion" on a product which is poisonous. It is used for the treatment of a highly contagious skin disease.

Another manufacturer applied for a trade-mark on "Alutropin" the name of a *nonpoisonous* colloidal aluminum-hydroxide fortified with homatropinemethylbromide. The higher court refused to permit the manufacturer to register this trade-mark, and said:

"Since they are both sold from the same shelves in the drug stores, it is our view that the goods of the parties are of the same descriptive properties and that the trade-marks are confusingly similar."

Bulk Mislabeled

A modern higher court has held that although chemicals are shipped in bulk, they must be properly labeled.

For instance, in Arner Company, Inc., v. United States, 142 Fed. (2d) 730, it was shown that a manufacturer shipped f. o. b. from New York to a drug company in Massachusetts certain chemicals seized on the premises of the drug company while in the bulk package in which they had been shipped. The chemicals were to be repackaged by the drug company for the retail trade.

The United States authorities alleged that the drugs were misbranded in that the label did not contain the required names of the active ingredients of the preparation and contained no statement of warning and directions.

Although the company intended to comply with the law by packaging and labeling the tablets to conform to the law before sale to the consumer, the higher court upheld legality of the seizure.

Warehouse Liable for Conversion

A modern higher court has held that if a warehouseman converts stored merchandise he must pay the holder of the warehouse receipt an amount based upon the retail ceiling price established by the O. P. A., instead of the wholesale ceiling price.

See Zemel v. Commercial Warehouses, Inc., 38 Atl. (2d) 132. A company purchased alcohol and chemicals at wholesale prices, and delivered same to warehouseman. The shipment comprised forty-four drums of alcohol, each containing fifty-four gallons. Approximately eighteen months later the company tendered to the warehouseman the storage charges and demanded delivery of the forty-four drums, but only thirty-eight drums were redelivered. The company instituted suit to recover damages for conversion of the six drums of alcohol.

During the trial, testimony was given which proved that on the same day the company presented the warehouse receipt and demanded delivery of the alcohol, the Office of Price Administration had fixed a wholesale ceiling price on alcohol at 87 cents a gallon, and has also fixed a retail ceiling price at $1.40 a gallon.

The counsel for the warehouseman contended that he should be held liable only for the lower ceiling price of 87 cents per gallon of alcohol which he had converted. However, the higher court held the warehouseman liable on the basis of $1.40 per gallon.

What Is a Dividend?

The word "dividend" often is used to refer to the payment of a portion of the profit of a corporation to its stockholders, but it has many other meanings.

For example, in Oilwell Chemical & Materials Company v. Petroleum Supply Company, 148 Pac. (2d) 720, it was shown that the Oilwell Chemical and Materials Company was incorporated. The question arose over division of corporation profits. The court held:

"There is eminent authority holding that where the stockholders of a corporation agree upon a distribution of its profits among all of the stockholders, such a distribution is a dividend even though the law requiring that the dividend be declared by formal action of the board of directors was not observed."

Revision of Price Indexes for CHEMICALS and DRUGS

DROP IN PRICE INDEXES for drugs and pharmaceuticals from 217.2 to 106.9 for December, 1944, and for chemicals from 104.8 to 94.8 results from change in method of calculation of applicable excise tax and quantity weight assigned to undenatured alcohol.

The Bureau of Labor Statistics has revised its wholesale price index numbers for drugs and pharmaceuticals and for chemicals and allied products for the period from October, 1941, to December, 1944, inclusive, reflecting a change in the method of computing the net tax applicable to the quoted price of undenatured ethyl alcohol and a reduction in the quantity weight assigned to this commodity for calculation of the index.

The price for non-beverage undenatured alcohol now used for index computations is the fully tax-paid price less the "drawback" or rebate, which first became effective on November 1, 1942. This procedure has been adopted because the tax refund is now being paid on a very large and increasing proportion of non-beverage undenatured alcohol. The quantity weight for alcohol has been reduced to about one-fourth of its former amount and now represents only that portion of the total which was consumed by the drug industry in the years to which the weights for the wholesale price index relate. Beginning with October, 1941, and until the drawback became effective on November 1, 1942, the revisions in the indexes are due solely to this reduction in the quantity weight. From November, 1942, through December, 1944, the revisions result from both the reduction in the quantity weight and the adjustment in the net tax. These revisions have been made on the basis of recently available tax data and after consultation with representatives of the industry.

Revised and Previous Indexes

The Bureau's revised index number for drugs and pharmaceuticals for December 1944 is 106.9 (1926=100) compared with the previously published figure of 217.2. For chemicals and allied products, the revised figure is 94.8 instead of 104.8. The major differences between the revised and unrevised indexes result from changes in the excise taxes on alcohol. For example, when the tax on 190 proof alcohol was raised from $7.60 to $11.40 per gallon in November, 1942, the previously published index for drugs and pharmaceuticals increased 28.4 percent, and that for chemicals and allied products increased 3.4 percent between October and November. As a drawback of $7.125 per 190 proof gallon also became effective on that date, the reduction of $3.325 in the net tax caused a decrease in the same period of 11.1 percent in the revised index for drugs and pharmaceuticals and of 1.3 percent for chemicals and allied products. From March to April, 1944, the previously published indexes rose 33.2 and 5 percent for drugs and pharmaceuticals and chemicals and allied products, respectively, because the gross tax increased $5.70 per 190 proof gallon. The revised series show increases from March to April, 1944, of only 5.3 and 0.5 percent, respectively, because the drawback was increased by $4.275 at the same time, offsetting most of the tax increase.

Deduction from Gross Tax

In the past, the price on undenatured alcohol used for index computations included the full Federal tax. This was in accordance with the bureau's general policy of including an excise tax in the price of a commodity when the tax directly affects the purchase price. In the case of ethyl alcohol, the Bureau also followed the practice of trade periodicals which, even during the past two years when a drawback was allowed, published a price which included the full tax.

Although the drawback became effective on November 1, 1942, the Bureau did not immediately change its procedure since data essential for determining how the drawback should be handled were not available. Some time necessarily elapsed before any information could be compiled with respect to the number of gallons of alcohol eligible for the drawback, the percentage of gallonage receiving the drawback, and the proportion subject to a drawback used by the drug and pharmaceutical industry. This was complicated by the accounting procedure wherein the seller pays the full tax and bills this amount to the purchaser, and it is the responsibility of the purchaser to file a claim with the U. S. Bureau of Internal Revenue for the rebate.

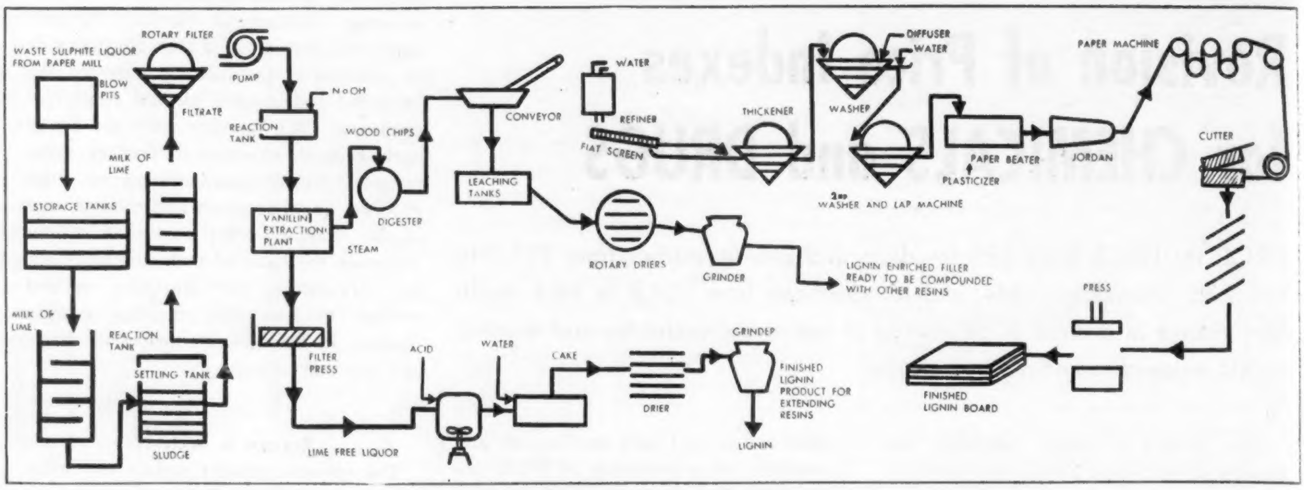
It is only recently that information became available which indicates that the tax refund is now being paid on a very large and increasing proportion of non-beverage undenatured alcohol. Accordingly, the Bureau of Labor Statistics in its revision of the indexes, adjusted the price for undenatured alcohol from November 1, 1942, the date when the drawback became effective, to reflect these refunds. Since manufacturers of drug products or other preparations containing alcohol compute their costs and selling prices on the basis of their eligibility for the drawback, the Bureau's revised method in computing the tax reflects changes in the effective prices of drugs and pharmaceuticals.

Revision in Weights

The revised quantity weight or multiplier assigned to ethyl alcohol in the calculation of the index is now only 24 percent of that previously used, and reflects only the quantities estimated to be consumed by the drug industry. Previously the quantity weight represented total withdrawals by all users of both tax-paid and tax-free alcohol. The tax-free withdrawals (22.5 percent of the original total) were subtracted from the quantity weight previously used, and this amount was further reduced by deducting that portion of the tax-paid withdrawals not consumed by the drug industry. Fifty-eight percent of the total tax-paid withdrawals of non-beverage alcohol was estimated to be consumed by the drug industry. Finally, to make the quantity weight consistent with the unit for which prices are quoted, the alcohol estimated to be consumed by the drug industry was converted from a basis of 100 to 190 proof.

The reduction in the weight assigned to this commodity reduced the total value aggregate (sum of the prices multiplied by the quantity weights) for the drugs and pharmaceuticals subgroup in the chemicals and allied products group. In order to maintain the relative importance of this subgroup in the group index, the reduced aggregates for the subgroup were proportionately increased. The conversion factor, or ratio, was obtained by dividing the previously used aggregate of the subgroup for September, 1941, by the revised aggregate for that month. (September, 1941, was the month used as the overlap period for linking the revised series into the index). The revised subgroup aggregate for October, 1941, and those for all subsequent months were multiplied by this conversion factor, or ratio. These changes have also been incorporated into the Bureau's weekly indexes as of October 4, 1941. Other subgroup indexes for chemicals and allied products, which have been previously published, are not affected.

Since the revision of this group index changed only the level of the comprehensive wholesale price index by a fractional amount (0.2 percent at a maximum) the revisions have not been incorporated into the Bureau's indexes.



Lignin Processing at the Marathon Corporation

PLASTICS from LIGNIN—II

by ROBERT S. ARIES, Polytechnic Institute, Brooklyn, N. Y.

THE UTILIZATION of sulphite liquor, alkali lignin, and agricultural products is discussed by the author in the second and concluding portion of his study of potential uses for this abundant raw material. Whether it will ever attain economic importance as a constituent of plastics depends upon the ability of chemists and engineers to obtain a product with unique properties.

BY SUBJECTING wood chips to about 1000 lbs. of steam pressure for a few seconds and releasing the pressure suddenly, a fibrous mass of unextracted lignin is obtained from which the well known "Masonite" wall board is made. A modification of this process gives a material that can be powdered and molded. Whereas Masonite cannot be considered a true plastic, the latter modification can be pressed to give a dark, hard, water-resistant product.

A similar plastic, obtained by an "explosion" at lesser pressures of redwood, was developed by the Institute of Paper Chemistry[2]. It is produced on a commercial scale by the Sheller Manufacturing Company under the name of "Shellerite" and is used in numerous applications, such as steering wheels.

Barkalai[7] and Iv[21] heat sawdust under pressure with water for several hours and claim a ligneous product which may be molded at pressures ranging from 400 to 100 kg. per sq. cm. at 200 to 250° C. The flow of the lignin product may be increased by the addition of a mixture of phenol and glucose[10]. In general, a thermal hydrolysis, besides activating the lignin, may cause a reaction of the extractives, thus increasing the plastic properties of the wood. For example, it is possible that the phenolic materials which exist in redwood react with the cellulose or its aldehydic dehydration products. Additional resins may be added to the mass in order to produce plastics with a wide range of properties.

SULPHITE LIQUOR

The disposal of waste sulphite liquors has been tackled for many years with little success. Recently there have been renewed efforts on the part of industry to obtain a solution, resulting in the creation of the National Council for Stream Improvement and the establishment of research projects at the Institute of Paper Chemistry, Mellon Institute, the University of Washington and several other agencies. Besides the better economic utilization of forest products, the problem of stream pollution might be an important stimulus for research in the field. Although some plastics are being produced from sulphite waste liquors (such as by the Marathon Corporation, Burgess Cellulose Company, Hammermill Paper Mills and Robeson Process Company) the quantities use only minute fractions of the available lignin[4].

Howard and his co-workers[20] treat the waste liquor with lime, recovering calcium sulphite in the first step and calcium lignin sulphonate in the second. The latter yields vanillin by a caustic treatment, while the spent liquor is used to cook more chips, yielding a plastic which may be made into sheets and pressed or ground into a molding powder. Laminated sheets (Lignolite) were discussed previously. A "lignin enriched filler" (LEF) is marketed by the Marathon Corporation[31]. It is obtained by cooking waste wood with the sulphite liquor under pressure. This material is similar to the lignocellulosic extenders described previously but has the advantage of having been in commercial production for some time and adapted in the formulations of several leading manufacturers of plastics. The lignin-enriched filler contains a higher proportion of lignin than does wood flour and commercial compositions have been made which consist of 20 to 30 per cent phenol-formaldehyde resin and 70 to 80 per cent LEF. After the preliminary mixing, the materials are run through rolling mills for approximately one minute, then cooled and ground.

Catapak

The Catalin Corporation has recently announced a compression molding compound, "Catapak," which has high impact strength combined with low cost. Catapak readily fits into established molding procedures and can be used at cycles, pressures and temperatures available on standard molding machines. The specifications of the standard Catapak are given in Table 2. The impact strength can be raised to .75 foot lbs. per inch of notch.

The Marathon Corporation also markets

Resin 26 (formerly "VDP" lignin resin) which is recommended for use with a water or water-alcohol soluble, low-polymer phenol formaldehyde resin. It is primarily used as an extender for varnishes, molding resins and adhesives. Resin 26 is a partially desulphonated lignin compound in which the sulphonic acid group is present as its sodium salt, while the phenolic and other weak acidic groups are present as weak acids. It is soluble in phenol, furfural and water, and in aqueous solutions of the lower aliphatic alcohols, ketones and aldehydes containing at least 20 per cent water. It is insoluble in aromatic and other aliphatic hydrocarbons.

Lignin and lignin-enriched pulp can be used potentially for preformed molded articles, which have received an impetus during the present conflict. The Ingersoll Watch Company, for example, has been making for several years alarm clock cases, flashlights, etc., by preforming or felting[16]. The procedure would be to suspend the lignin-enriched pulp in water in a beater, then form it to shape in a die, either by vacuum or by pressure. The dried preform may then be molded under usual temperatures and pressures. The articles obtained (such as Kysite, produced by the Keyes Paper Company) are much stronger than ones made from molding powders. At present only phenolic and lignin-extended compositions have been successful.

can be used as a binder, phenolic extender, and base for other chemicals. Crepaz and Bertolini[14] report the production of alkali-lignin products with high water resistance. They contain aniline and formaldehyde.

The product of the West Virginia Pulp & Paper Company has been recently made available in experimental quantities. It is refined from the black liquor of sulphate mill and has close specifications in properties. For example, the refined grade is 98 per cent soluble in dioxane, contains less than 0.6 per cent ash and from 0.8 to 1.5 per cent sulfur. Its methoxyl content is from 10 to 15.

Table II—Tentative Specifications Catapak 100, 101, and 102

Specific Gravity	1.39 to 1.40
Tensile Strength	8,000 lbs. per square inch
Impact Strength	.45 ft. lbs. per in. of notch
Flexural Strength	9,000 lbs. per square inch
Water Absorption	Less than 1%
Bulk Factor	3.2 to 3.5
Molding Shrinkage	.006 to .008 inches per inch
Weight of 1 c.c. of powder	.40 to .44 gms.
Recommended Molding Pressure	2,000-4,500 lbs. per sq. in.
Recommended Molding Temperature	300 to 370° Fahrenheit

Powder is ground to pass a #16 U. S. Standard Sieve.
Powder pours through standard opening, 15 to 25 seconds.

Miscellaneous Lignin Resins

Numerous other lignin resinous products have been prepared; it is hoped that the bibliography will provide a source of information on various other attempts to utilize this material. Morgan[33] reports a series of thermosetting compositions having the properties of hard rubber and phenolics. Wein[49] prepares a plastic with lignin and a natural resin such as gum accroides. Jahn and Coppick[22] nitrate finely divided lignocellulosic material to obtain a product suitable for films, filaments and lacquers. Matveev and Gallai[30] impregnate birch with 20 per cent glucose solution, dry to 15 per cent water content, compress to about 90° C. and then heat to 130° C. for 1½ to 2 hours.

Compregnated wood was developed in the United States by the Forest Products Laboratory[47] and has a wide use in the war effort. "Papreg," a laminated paper, has also been developed in the last few years[48] and has found a multitude of uses[6]. These products have no lignin added to them as a bonding agent, although some experimentation is being done along these lines at present. Wood can be plasticized by means of urea, a treatment which has recently been extended to the use of resins, such as methylol urea[28], widely publicized by duPont. Several wood-using companies, including the Timber Engineering Company are now doing further work on it. These "improved" wood products are somewhat out of the scope of this article.

A special lignin compound has been developed for use in compounding synthetic rubber, particularly gasket stock. The inclusion of this lignin in the rubber batch results in improved heat resistance, improved oil resistance, and an absence of permanent set, even after long periods of strain. The use of this lignin compound in natural latex will increase considerably the ease of milling. Research is now in progress in this direction, especially for obtaining with lignin the high strengths obtainable with other reinforcing compounds.

Another use on which research is now being done is the incorporation of lignin fillers into cellulose acetate plastics. Tests show that lignin reduces substantially the cold flow of these thermoplastics. If perfected, this use may develop into an outlet for substantial tonnages of lignin.

AGRICULTURAL PRODUCTS

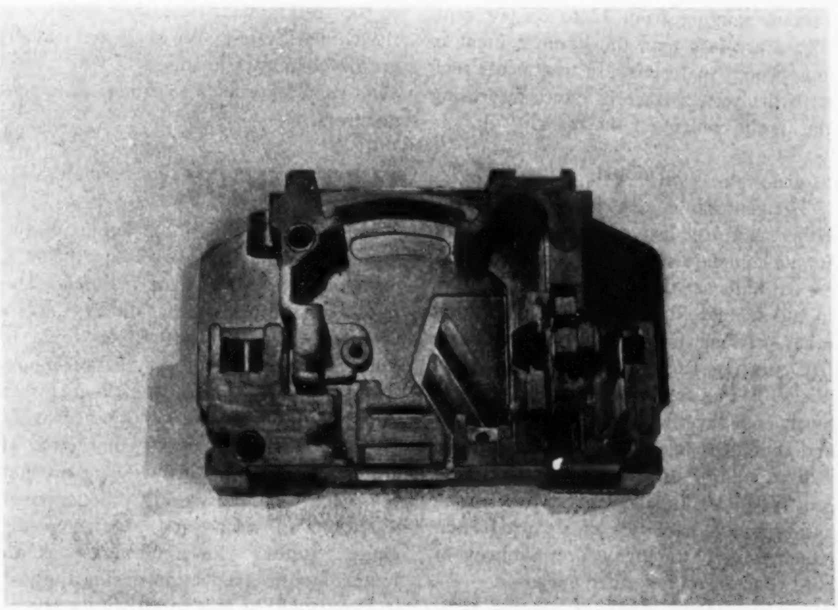
Paralleling the work on wood plastics, there has been considerable experimenta-

ALKALI LIGNIN

Alkali lignin products have also been the subject of numerous investigations. Several materials are now on the market such as those of the Howard Smith Pulp Mills, Mead Corporation and the West Virginia Pulp & Paper Company.

Phillips and Weihe[37] condense alkali lignin with furfural and aromatic amines to prepare synthetic resins useful in varnishes. Dimethylaniline-lignin resins are claimed to be useful in paper laminates. According to Morrell[34], the use of lignin furfural resins should be of interest as a source of prefabricated building materials.

Plunguian[38] has prepared a commercial product from alkali pulp liquor. By precipitating with carbon dioxide, washing, and drying, a purified alkali lignin is obtained. It is claimed that this product



An intricate electrical connector molded from plastics made with hydrolyzed lignocellulose

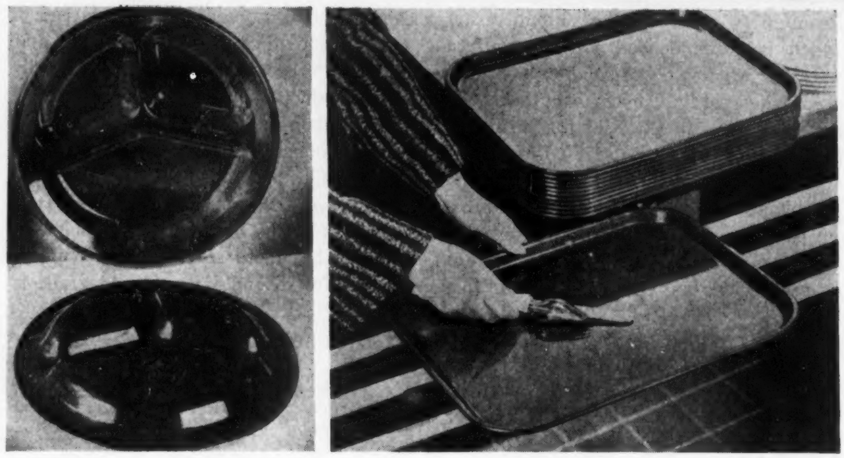


Illustration courtesy Keyes Fibre Co.

High strength trays are made with phenolic pulp products

tion on the production of lignin plastics from agricultural surpluses and by-products. Agricultural wastes have a somewhat lesser potential value than wood wastes[5]. In both cases, it is difficult to bridge the gap between the laboratory development of these products and their economic production on a commercial scale. Their slower and less uniform curing properties make them less acceptable than some synthetic plastics. Several industrial firms, government agencies, and colleges are working on the problem. They include the Northern Regional Research Laboratory, Iowa State College, Polytechnic Institute of Brooklyn, Valentine Sugar Company, Godchaux Sugar Company, the Ford Motor Company, etc. The cellulose, lignin, protein, and pentosans in agricultural wastes can all be useful for plastics, although to the writer's knowledge no large scale runs have been made of any product. It may be that the mucilagenous materials, silica, and grit present in some wastes would cause gumming of the molds and have an unfavorable effect on their surfaces because of scratching. There is no fundamental reason why agricultural wastes could not be utilized just as wood wastes for the production of plastics. Corncobs, bagasse, cottonseed meal, soybeans, etc., have been investigated[8] with little success from the commercial point of view.

An analysis of agricultural residues is given in Table 3. It indicates a lignin content ranging from 12 to 25 per cent. These are less than the lignin content in most woody materials. In treatments such as hydrolysis, we are in effect increasing the lignin content of the mass.

Table 3—Analyses of Agricultural Residues, Oven Dry Basis[1]

	Ash %	Lignin %	Pentosans %	Extractives %
Corn stover	8.11	12.6	25.95	12.85
Corn stalks	4.11	15.65	24.36	18.68
Corncobs	1.67	12.48	38.9	1.27
Wheat straw	8.94	14.69	31.2	1.85
Oat straw	5.05	17.4	30.2	1.49
Rye straw	4.51	16.38	30.7	1.23
Flax shives	3.89	24.93	26.6	3.93
Bagasse	3.00	20.5	30.0	0.37
Tobacco stalks	10.2	13.68	19.8	9.23
Oat hull residues	8.6	45.5	1.86	3.78

[1] Data from Clark and Aronovski, Mod. Plastics, Dec. 1944

Furfural

The pentosan content is also of interest, either as a producer of furfural *in situ* or for its commercial manufacture. At present oat hulls are the sole source of furfural in the United States, but it may be that other products with a high pentosan content (such as bagasse) could become suppliers of this versatile chemical. Some hardwoods are also of potential value and should be taken into consideration in a discussion of furfural. The Northeastern Wood Utilization Council is investigating the possibilities of its production either directly or by a pretreatment of hardwoods used for other purposes.

A comparative study of several agricultural residues for use in plastic compositions has been conducted by Clark and Aronovsky[12]. It included corn stover, corn stalks, corncobs, wheat straw, oat straw, rye straw, flax shives, sugarcane bagasse, tobacco stalks, and hydrolyzed oat hull residue resulting from furfural manufacture.

While one raw material may have some advantage over another with a particular type of treatment, no outstanding superiority can be claimed for any one of the agricultural residues investigated by these investigators.

Considerable additional research will be necessary to adapt economically plastics derived from farm products and wastes to the requirements of custom molders in the United States. We shall undoubtedly see developments in this field which shall yield usable products to American manufacturers.

THE OUTLOOK

Most of the uses of the lignin plastics previously discussed are in the realm of potentialities, rather than realities. Despite a shortage of plastics during the last few years, lignin has not been able to emerge from the laboratory as an important raw material. It is estimated that less than 20 tons a week of lignin plastics and extenders are being marketed at present. This is an insignificant amount compared with the weekly production of 8000 tons of resins and plastics in the United States. The tremendous rise in synthetic resin production during the last few years will be able to satisfy the short-term civilian demands upon the slackening of military requirements; thus, no pressure is expected for additional amounts of raw materials, which might have encouraged lignin production. Moreover, synthetic production is capable of a rapid expansion if the need should arise. Presently known lignin plastics do not, in general, have properties of their own which cannot be duplicated easily or economically by other plastics.

In fact, in many cases lignin has been used as a substitute for already existing materials, such as phenolics. This may be the wrong approach. If large tonnages are to be produced, some specific and inherent properties of lignin should be further investigated. For example, the structural and building materials field has specifications which vary from those of true plastics. Lignin is probably better suited for uses in which its molding characteristics and physical properties, especially water absorption and strength, will be better adapted. The careful control required in modern plastics manufacturing also puts lignins in a disadvantageous position. By-products of other processes such as pulping or hydrolysis enter into this category. A process such as the separation of the lignin and cellulose by bacterial action for the purpose of isolating a "pure" lignin may prove to be interesting for the plastics industry. Pulping with novel reagents as phenol or sodium phenate may also be of interest.

Hydrolysis with different acids may yield a different lignin, besides alcohol, yeast, and cattle fodder. For example, a hydrolysis with dilute hydrofluoric acid is reported to yield a substantially white lignin. A light-colored product could be used in numerous applications where the dark resins can find no market. Such a process may provide an outlet for the excess productive capacity of hydrofluoric acid after the war.

Lumber Research

It is difficult to base predictions of future possibilities on the basis of present

performance, as research may alter the picture overnight. The wood products industry has only recently realized the value to itself of better utilization of its products and wastes. Financially strong lumber companies and associations are establishing research departments which have already shown excellent results. The products of the lumber industry are valued at over two billion dollars annually, and even if a minor fraction of that sum is to be spent for research, we may expect considerable progress in the field. The National Council for Steam Improvement, recently organized by the pulp and paper industry, is another expression of the effort of pulping mills to find an outlet for their wastes. Research at the Forest Products Laboratory, expanded by wartime demands, is also indicating further the versatility of wood. The Regional Laboratories of the United States Department of Agriculture have done excellent work in agricultural by-products utilization. Undoubtedly research will open new vistas in this field.

The future of lignin plastics clearly is in the hands of the chemist and engineer. The utilization of the available tonnages of waste lignin and the large additional amounts which could be produced will require the ingenuity of the research worker and development engineer. Besides plastics and low-priced board-type products, other outlets should also be investigated, since plastics cannot be considered a panacea for all waste disposal and by-product problems. Present work will yield new and improved substances of a resinous nature, and it may be expected that a number of new marketable products of lignin will soon make their appearance on the market. Research may transform lignin into a lucrative raw material of the future and place it in the permanent picture of the American chemical and plastics industries.

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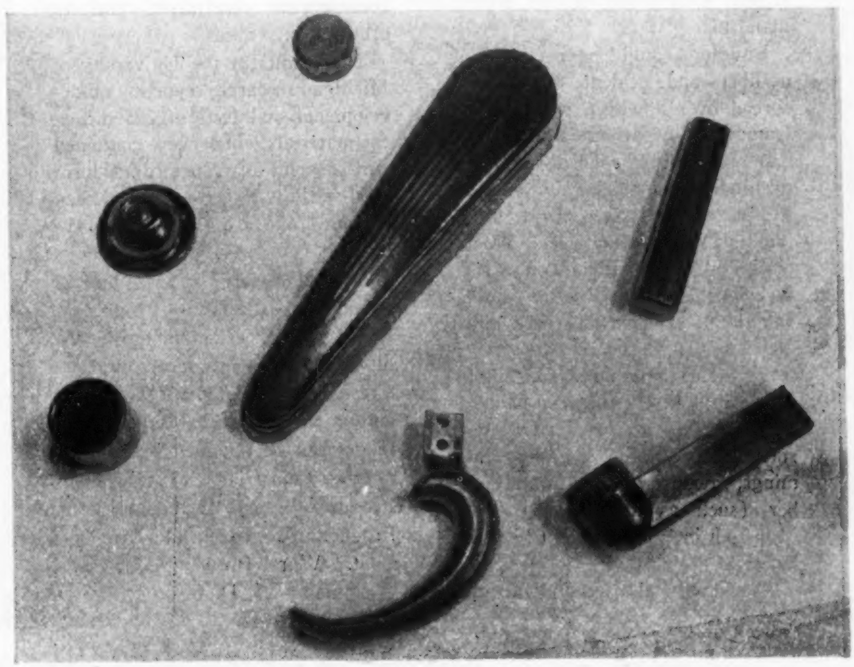

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Author's note: Thanks are due to Dr. Paul F. Bruins for cooperation in connection with this article.

FARM AND SAWMILL WASTES UTILIZED

RESEARCH carried out by the Department of Engineering Research of the University of Michigan under contract with the Office of Production Research and Development will make possible the use of farm and sawmill by-products and commercially unused wastes to make low-cost, lightweight building materials.

Indications are that some of the mixtures of wastes combined with cement or concrete are suitable for machine fabrication of insulating, weather- and fire-resistant building boards for wall, roof or floor panels. Other compositions may find use in shingles or for exterior siding in the form of large sheets. Still others could be used for floor tile, water pipe, and other products which require exceptionally strong, cheap, and rigidly setting materials.

Buildings could be constructed of a fiber and cement composition spread over a woven wood lattice framework by farmers from a mixture of cement, chemicals, and farm by-products, particularly in view of the present shortages of the more familiar building materials. Waste organic fibers available on farms include flax shives, cotton stalks and linters, and various seed hulls and straws. In general, however, these materials require considerable preparation before they can be used in such compositions. Wood wastes, such as forest and sawmill trimmings, sawdust, and low-grade timber (such as aspen poplar and Michigan jack pine) might be used as well.

The report also points out the possibility of using native cane (bamboo) and *Phragmites communis,* or "great reed," which grows unused on thousands of square miles of tidewater flats.

In the density range of about 75 lbs. to the cubic foot, some of these compositions show compressive strength of 4000 lbs. per square inch, and tensile strength of 750 lbs. The lighter materials, in the hardwood lumber range of 40 lbs. per cubic foot, showed sufficient strength to be of practical use in building construction.

Not only are these findings of special value in view of the current building materials shortage, but also do they point a way to the profitable utilization of these waste materials. In addition, there is a need for low-cost, fire-resistant construction on farms and in crowded city areas.

The results of the University of Michigan research, reporting on development and tests of 225 different materials which were combined with cement or concrete to form hard-setting aggregates, have been compiled under the title, "Properties of Assorted Lightweight Aggregate Materials," and will be distributed by the War Production Board to engineering and university libraries, cement producers, and interested trade associations. Information on the availability of this report can be obtained by writing to the Industrial and Consumer Products Branch of the Office of Production Research and Development, War Production Board, Washington 25, D. C.

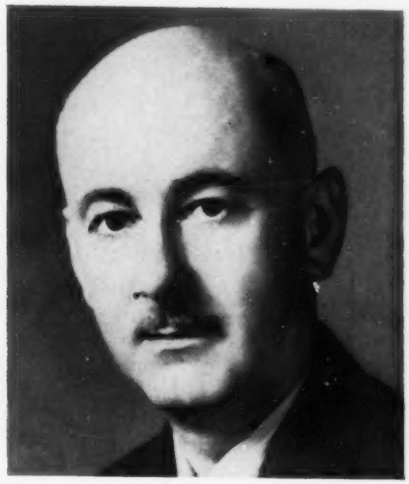
HEADLINERS in the NEWS

IVAN F. HARLOW of the Dow Chemical Co. who has directed bromine development and production, has been appointed production manager for the inorganic division.

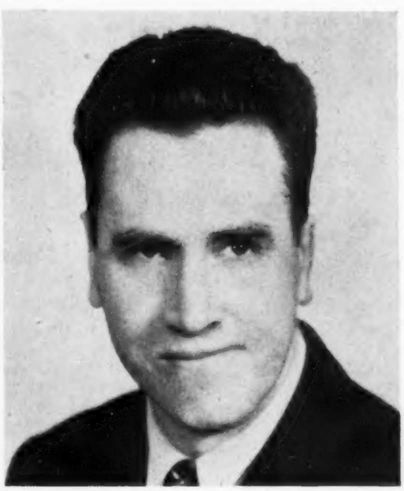
DR. E. R. GILLILAND, chemical engineering professor at MIT now with OSRD has been chosen first recipient of the Leo H. Baekeland Award of the N. J. section ACS.

DR. DONALD PRICE, formerly with National Oil Products, for the past year with Interchemical Corp., has been named technical director of Oakite Products, Inc.

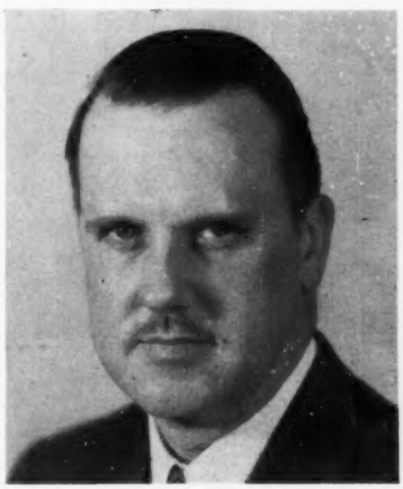
JOHN W. THOMAS, chairman, Firestone Tire & Rubber Co., has been awarded the American Institute of Chemists' Gold Medal for research and synthetic production.



HOWARD A. SOMMERS, former project engineer of the Mathieson Alkali Works, has been made chief engineer of the corporation, with headquarters in New York City.



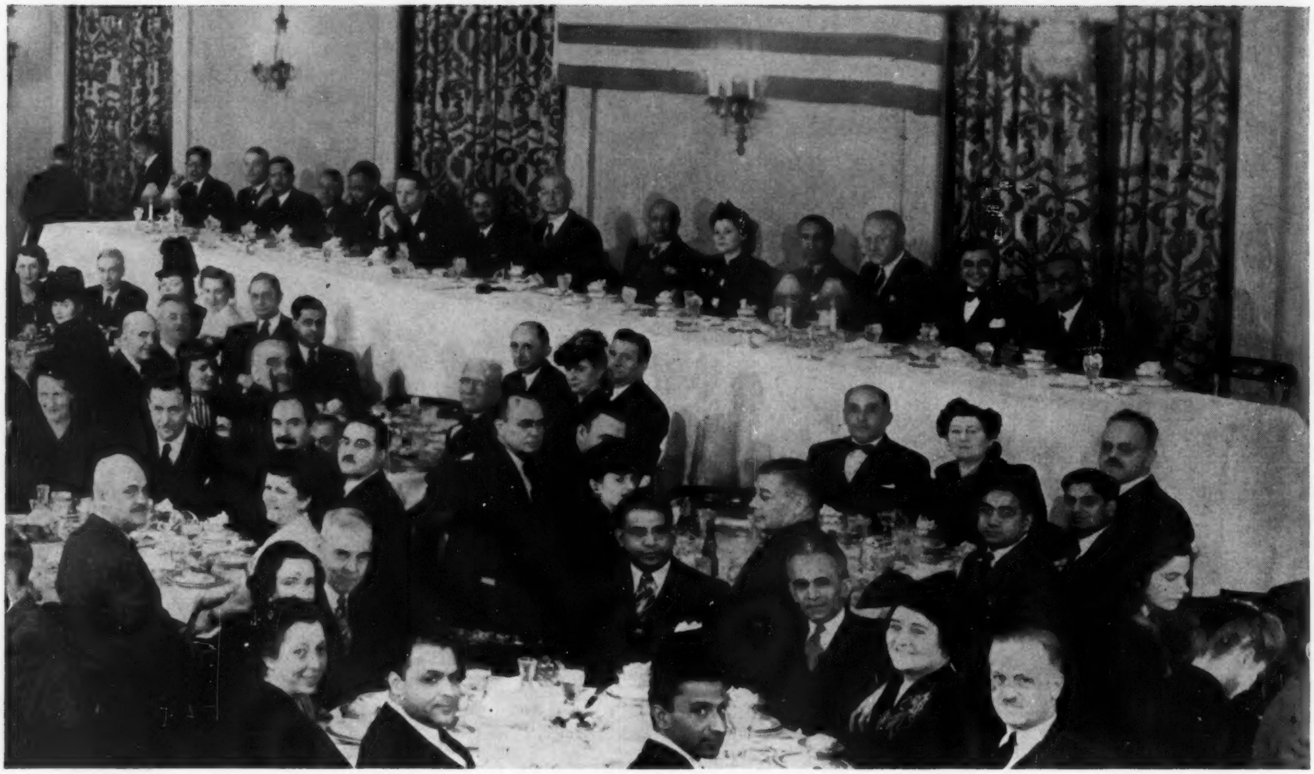
DR. JOSEPH R. STEVENS has been appointed director of organic research by J. T. Baker Chemical Co., where he will head a program aimed at expansion in this field.



EVERETT C. GOSNELL has been appointed manager, chemical division of the Lukens Steel Co., and its subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

JOE W. COFFMAN has been appointed vice-president of the General Aniline and Film Corp., in charge of the Ozalid division with office and factory in Johnson City, N. Y.

Indian Scientists Honored

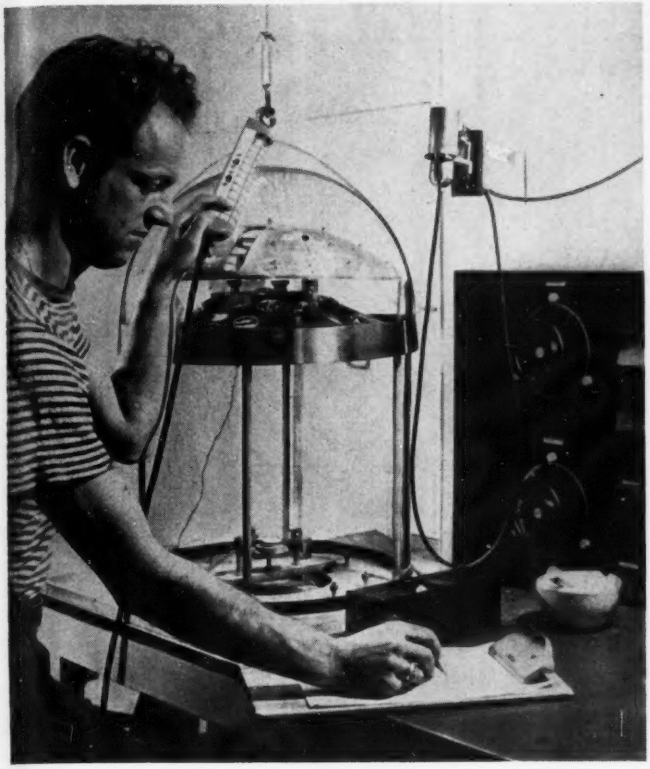


Members of the Indian Scientific Mission to America were honored at a dinner held at the Hotel Commodore February 1 under the auspices of the Indo-American Science and Technical Association. At the speakers' table, from left to right, were Dr. J. N. Mukherji, University College of Science, Calcutta; Dr. H. C. Urey, Columbia University; Sir J. C. Ghosh, director, Indian Institute of Science; Dr. V. R. Kokatnur, consultant; Dr. M. Saha, Calcutta University; Louis Bromfield; Sir S. S. Bhatnagar, Director of Scientific and Industrial Research, Government of India; Dean Geo. B. Pegram, Columbia University; Dr. G. B. Lal, American Weekly; Mrs. B. D. Saklatwalla; Dr. Nazir Ahmad, director, Indian Central Cotton Committee; Dr. Waldemar Kaempfert, New York Times; Dr. K. Shridharani, Columbia University; and Dr. S. K. Mitra, Calcutta University. The Mission is currently making a tour of inspection of American facilities.

Foreign Delegations See GR-S Produced

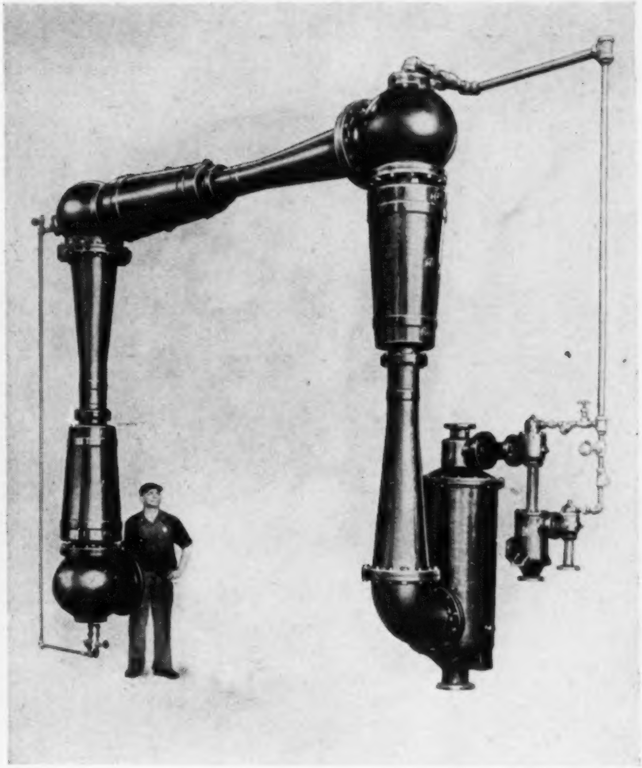
Representatives of the British and Dutch delegations to the second international rubber conference inspected the Government-owned plant in Louisville, built and operated by the B. F. Goodrich Company. These men have been associated with the natural rubber industry in the Far East. Left to right are Dr. T. A. Tengwall, Board for the Netherlands Indies. William S. Richardson, manager, Chemical Division, B. F. Goodrich Company; F. G. Lee, United Kingdom Treasury; (rear) Sir Walrond Sinclair, Institute of the Rubber Manufacturing Industry; A. G. Pawson, London Rubber Secretariat; and J. N. Du Barry, War Supplies and Resources Board.

Lenses Chemically Treated



Mounted on a panel inside a bell jar, lenses are given a coating of magnesium fluoride to improve their light transmission and field definition characteristics. Activation by a fluorescent lamp gives a violet coloration, the degree of which measures the thickness.

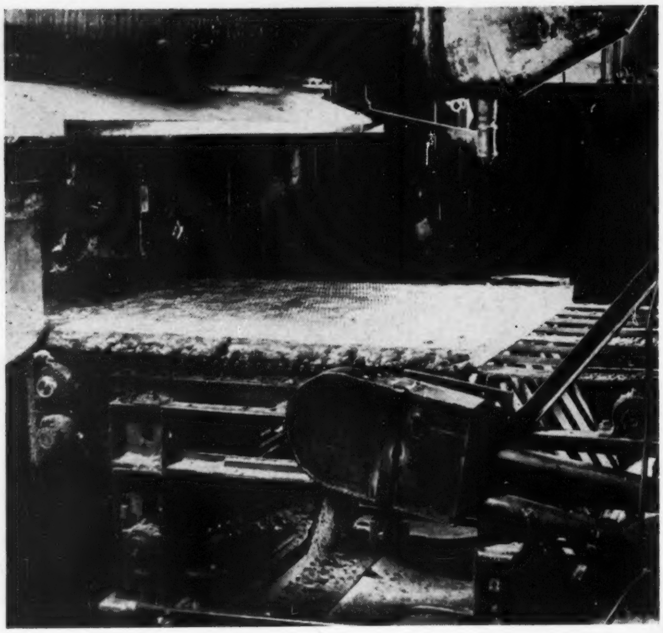
Largest Ejector



This Elliott Company five-stage ejector has the largest capacity at 100 microns of mercury of any vacuum equipment ever built. A comparable mechanical pump operating at 65 per cent volumetric efficiency would require a displacement of 15,600 CFM.

Portable Electron Microscope

For use in its own laboratories, General Electric Company has designed and built an electron microscope of suitcase size. The main unit, including the power supply, high-vacuum diffusion pump, and the electron-optical system, weighs only 78 pounds. The mechanical vacuum pump, weighing 55 pounds, is a separate unit. The main unit is shown in the photograph with its side panel removed to reveal the construction. It has not been made commercially available.

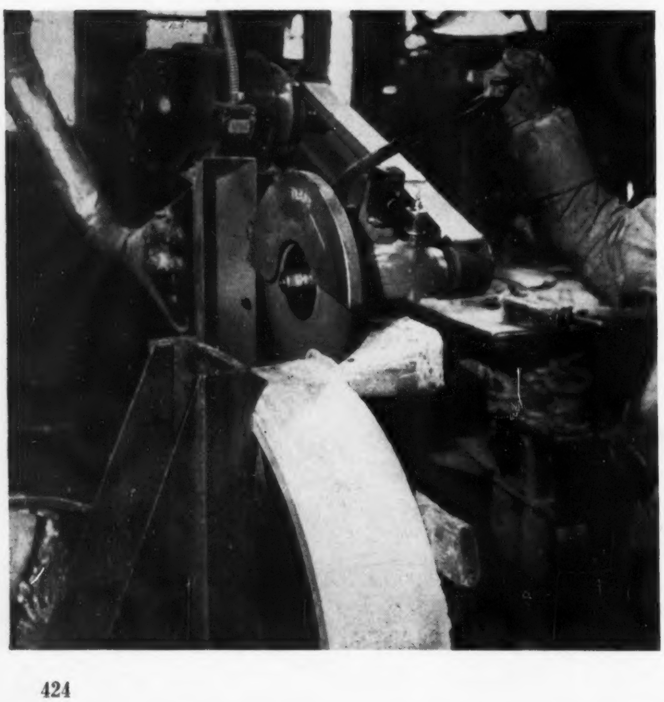


Neoprene-Fiberglas Conveyor Belts

The combination of synthetic rubber and glass fiber appears to be uniquely adapted for conveyor belts operating under severe conditions. Replacing rubber-covered cotton belts, whose average life was six weeks, three-quarters of these belts have lasted seven months while continuously carrying material at 300 degrees F. The belts are subjected to considerable flexing and to contact with oil. In fabricating the belts, the B. F. Goodrich Company used two inner and two outer plies of Fiberglas cloth. These were given a thin coat of Neoprene, calendered, and assembled. The Neoprene cover was then applied and the entire assembly press cured and cut to proper dimensions.

Magnesium Safe for Cooking Utensils

The wartime publicity about incendiary bombs has led people to believe that magnesium is highly inflammable. The fact that its ignition temperature is actually very high was dramatically illustrated before the 17th Annual Fire Instructors Conference in Memphis. Spareribs were cooked on a magnesium grill which was supported on piled up magnesium ingots and the whole subjected to the flame of a blow-torch. Bulk magnesium, unlike the powdered material, is extremely resistant to ignition; and even iron will burn when it is in a finely divided state.



Synthetic Rubber in Abrasive Wheels

Interest in synthetic rubber has been largely centered on tires, without too much thought of its other industrial applications. Now it has been reported by the Hycar Chemical Company that synthetic rubber is a superior bonding agent for abrasive wheels, used in metal-working industries for cutting non-ferrous castings. Manganese-bronze castings were cut by identical wheels fabricated from natural and synthetic rubber, and the latter gave almost twice as much service.

RESEARCH REPORT ...from the VICTOR Laboratory Note Book

New Chemicals Available for Industrial Research

SUBJECT—PHOSPHONATE ESTERS

SUMMARY OF PROPERTIES

Name	DIOCTYL PHENYLPHOSPHONATE	DIOCTYL STYRYLPHOSPHONATE	DIOCTYL I-OCTENYLPHOSPHONATE
Formula	$C_6H_5P\begin{array}{l}\diagup OC_8H_{17}\\ = O\\ \diagdown OC_8H_{17}\end{array}$	$C_8H_7P\begin{array}{l}\diagup OC_8H_{17}\\ = O\\ \diagdown OC_8H_{17}\end{array}$	$C_8H_{15}P\begin{array}{l}\diagup OC_8H_{17}\\ = O\\ \diagdown OC_8H_{17}\end{array}$
Physical State	Liquid	Liquid	Liquid
Color	Yellow to colorless	Straw to colorless	Straw to colorless
Molecular Weight	382	408	416
Specific Gravity	0.967 (25°C)	0.973 (28°C)	0.909 (28°C)
Refractive Index	1.477 (N_D)	1.500 (N_D)	1.455 (N_D)
Acidity	<0.5 cc 0.1 N NaOH/10 cc to phenol.	<0.5 cc 0.1 N NaOH/10 cc to phenol	<0.5 cc 0.1 N NaOH/10 cc to phenol.
Hydrolysis	0.1 cc 0.1 N NaOH/10 g/2 hrs. in 100 cc boiling water to phenol.	0.2 cc 0.1 N NaOH/10 g/2 hrs. in 100 cc boiling water to phenol.	0.2 cc 0.1 N NaOH/10 g/2 hrs. in 100 cc boiling water to phenol.
Boiling Point	204–207°C (4 mm.)	235°C (4 mm.)	214°C (4 mm.)
Melting Point	Semi-solid at –70°C	Glass at –79°C	Viscous at –80°C
Surface Tension	32.3 dynes/cm (30°C)	32.7 dynes/cm (30°C)	29.6 dynes/cm (30°C)
Viscosity	27 centipoises (30°C)	57 centipoises (30°C)	21 centipoises (30°C)
Solubility	Sol. common org. solv.	Sol. common org. solv.	Sol. common org. solv.
Water Solubility	<.015 g/liter	<.0169 g/liter	<.0345 g/liter
Flash Point	370°F (open cup)	295°F (open cup)	395°F (open cup)
Fire Point	395°F (open cup)	325°F (open cup)	410°F (open cup)
Evaporation Rate	0.0031 g/sq. cm. (100 hrs. at 100°C)	0.0011 g/sq. cm. (100 hrs. at 100°C)	0.0078 g/sq. cm. (100 hrs. at 100°C)
Possible Uses	Plasticizer; anti-foaming agent; lubricant; oil-additive.	Plasticizer; anti-foaming agent; lubricant; oil-additive.	Plasticizer; anti-foaming agent; lubricant; oil-additive.

COMMENTS—These compounds represent a class of organic phosphorus compounds not previously available to industry. They differ from the well-known tertiary phosphate esters by having a carbon of one group directly attached to phosphorus. The octyl esters are high-boiling, inert, pure liquids which possess low evaporation rates, low water solubilities, and high degrees of compatibility in various resins

Methyl, ethyl, propyl, butyl, amyl, phenyl, and cresyl esters of the three phosphonic acids could be made available. They comprise a large group of neutral organic phosphorus compounds which possess many varied properties.

NOTE—Because of present limitations in the supply of certain critical materials, samples of the above and other Victor Research Chemicals announced from time to time are not always available. Those that are will be sent promptly upon request. Others, for which research has established important uses in essential war production, are already available in commercial quantities.

BETWEEN THE LINES

Synthetic Fuels Program

Both Department of Agriculture and Bureau of Mines are vigorously going ahead with the enlarged Federal synthetic fuels program. Agriculture's semi-works plant for operation on farm wastes is going up on the grounds of the Northern Regional Research Laboratory at Peoria, Ill. Center of the Bureau of Mines project will be at Bruceton, Pa., near Pittsburgh. Plans, construction, and staff selection are well along at both places.

FOLLOWING legislative action by Congress in the past year, and awakened official interest in the projects, experimental and development work in the production of synthetic liquid fuels is now in progress in both the Bureau of Mines and the Department of Agriculture.

The work of the latter department has attracted less attention than that of the Bureau of Mines, possibly because the inter-departmental arrangements were not widely publicized. However, under the Act appropriating funds for the Interior Department in April, 1944, provision was made for transfer of certain amounts to the Department of Agriculture to cover that agency's work involving production of synthetic fuels from agricultural and forestry products.

These funds were transferred to the Agriculture Department last September. In mid-November a meeting was held at the Bureau of Mines station at Pittsburgh, Pa., at which various engineering matters were considered and the progress of the work to date reported on. Similar meetings will be held about twice yearly henceforth.

Meanwhile, the fund was utilized, as required, for erection and operation of a semi-works plant, to establish the technical feasibility and cost factors of a continuous process for saccharification of agricultural residues to products from which liquid fuels can be made. This process has been developed by the Agriculture Department on a laboratory scale through the Bureau of Agricultural and Industrial Chemistry.

Semi-Works at Peoria

A synthetic fuels project has been established under direct administration of the chief of that Bureau and independent of the other activities of the Bureau.

The semi-works plant when completed will be on the grounds of the Northern Regional Research laboratory of the Bureau, at Peoria, Ill. The site was selected because the laboratory, as a part of its regular research program, has a large pilot plant for conversion of carbohydrates by fermentation to such liquid fuels as alcohol, butanol, and acetone. The laboratory also has liquid motor fuel testing facilities.

The semi-works plant is being assembled to study this process and is designed to have an 8-hour operating capacity for producing approximately 2,000 pounds of dextrose, 1,600 pounds of xylose, 200 pounds of furfural, and 1,000 pounds of lignin, from 6,000 pounds of agricultural residues. Early in January specifications and plans had been drawn and bids for construction were being advertised.

Much of the equipment for this plant, however, has required special design and must be manufactured from acid-resistant bronze alloys. Some of this equipment has been received, while specifications and plans for most of the remainder have been drawn and bids sought for construction. Meanwhile a skeleton staff has been assembled in the field, and has been engaged on these preliminaries, as well as laying out initial operations.

A similar note of activity has emanated from the Bureau of Mines, which has long been interested in this field of research. The Bureau has established an Office of Synthetic Liquid Fuels, which will direct the work. There has also been assembled a staff, which the Bureau states includes "several of the best liquid fuel experts in the country." The staff members have not been named publicly.

For the past six months, it is stated, the major effort has been the design and launching of construction of the demonstration plants authorized under the April, 1944, law. Also being rushed to completion are the pilot plants, which are intended to furnish, among other things, special test fuels for the Navy, as well as data concerning production of aviation gasoline.

The Office of Synthetic Liquid Fuels is within the Fuels and Explosives branch of the Bureau of Mines, and includes five divisions: oil shale, synthesis gas production, gas synthesis demonstration plant, development and pilot plant, and hydrogenation demonstration plant. The first will have research, pilot plant and demonstration plant work; the second, production of carbon monoxide and hydrogen; the third, construction and operation of demonstration plants; and the other two, respectively, hydrogenation and gas synthesis processes, and construction and operation of demonstration plants.

The first three divisions are complete, and the last two are in process of formation. Buildings for the development of hydrogenation and gas synthesis processes, and for pilot plant work in this connection, will be constructed on Bureau of Mines property at Bruceton, Pa.

Hydrogenation studies will be conducted in a battery of small converters to determine the most economical methods of hydrogenating American coals and to develop improved processes that are said to hold promise of halving the cost and the size of the equipment needed for the process. This laboratory also will contain the equipment for production of up to 10 barrels of gasoline daily by coal hydrogenation. This gasoline will be used for special engine tests by the Bureau of Mines and the air services of the Army and Navy.

Designs for the new buildings to be erected at Bruceton are about ready, and immediate construction is contemplated. Design of equipment and pilot plants has kept pace with the first-mentioned, and negotiations have been under way with manufacturers and suppliers with the prospect that buildings will be completed and the pilot plants in operation by the Fall of 1945.

The research and development part of the oil-shale program has for a main purpose the determination of fundamental chemical, physical, thermodynamic, and engineering data, and development of processes that may be used in the design, construction and operation of large pilot or demonstration plants for mining oil-shale, producing oil from shale, and refining this oil into marketable products.

This latter phase will go into methods and equipment for large-scale mining of oil shales of various characteristics under varying conditions, and costs of mining, some of which data will be based on operations of commercial mines. The oil-shale research and development laboratory will be erected on Bureau of Mines property at Laramie, Wyoming, design for which has been completed, with construction due to start at this writing.

Production of shale oil from individual retorts at a rate of above 100 barrels daily is expected to be under way by the Fall of this year. This will be sufficient to provide material for refining and engine test programs.

NEW PRODUCTS & PROCESSES

Acetylacetone

Carbide and Carbon Chemicals Corporation is now producing acetylacetone (pentanedione-2, 4) in commercial quantities. This diketone contains an active methylene group which is the foundation of much of its chemical reactivity and produces some unusual condensation products. It is a valuable starting material for the preparation of a variety of compounds of interest as pharmaceutical and dyestuff intermediates, solvents, plasticizers, insecticides, resin stabilizers, corrosion inhibitors, and "sulfa" drugs.

As shown in the technical information sheet offered by Carbide and Carbon, pentanedione functions as a univalent radical to react with metal oxides or metal salts such as those of chromium, cobalt, copper, manganese, mercury, nickel and zinc, forming quite stable, characteristically colored metal salts. Certain of these metal salts of pentanedione show particular promise as addition agents for petroleum products. It is possible that pentanedione metal salts may prove a useful means of separating or purifying metals that are difficult to refine by more conventional methods.

Pentanedione condenses readily with aniline to form a product that can be dehydrated to 4-methylquinaldine, which in turn can be used in the manufacture of important carbocyanine dyes. These dyes are widely employed as sensitizers in color photography. Dyestuffs similar to the Hansa yellows are formed when pentanedione is condensed with aromatic diazo compounds. This diketone also condenses with guanidine to form the important "sulfa" drug intermediate 2-amino-4, 6-dimethylpyrimidine.

In addition to pentanedione, Carbide and Carbon Chemicals Corporation can supply development quantities of other interesting 2, 4-diketones possessing hydrocarbon solubility and lower water solubility than pentanedione.

Hydraulic Oil Viscosity Improver

A new acrylic resin formulation, designated Acryloid HF, has been developed by the Rohm & Haas Company, Washington Square, Philadelphia, to improve the viscosity characteristics of hydraulic oils.

This agent combats the inherent tendency of oils to become extremely viscous at sub-zero temperatures and excessively fluid under heat. Since hydraulic oils are used for power transmission in aircraft to raise and lower landing gear, operate turrets, control rudders, propeller pitch, and the like, and also to absorb the recoil impact of guns, this process is important military-wise. Its use is foreseen wherever hydraulic oils are employed under severe temperature conditions.

Screening Out Ultra-Violet Radiation

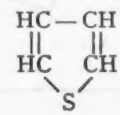
More than 99.9 per cent of the ultra-violet rays in sunlight are absorbed by a chemical of the azine type which has been incorporated into plastic goggles. All visible light is transmitted, according to the Polaroid Corporation, Cambridge 39, Mass., which has introduced this process, but the shorter radiation, which causes severe burning at high altitudes, is effectively absorbed.

Ultra-violet absorption by organic compounds is not unique, but this particular combination with a transparent plastic gives a material which is stable, transparent to visible light, and non-fluorescent.

Thiophene Commercially Available

An inexpensive process for making thiophene from petroleum has been announced by the Socony-Vacuum Oil Company, Inc., 26 Broadway, New York 4, N. Y.

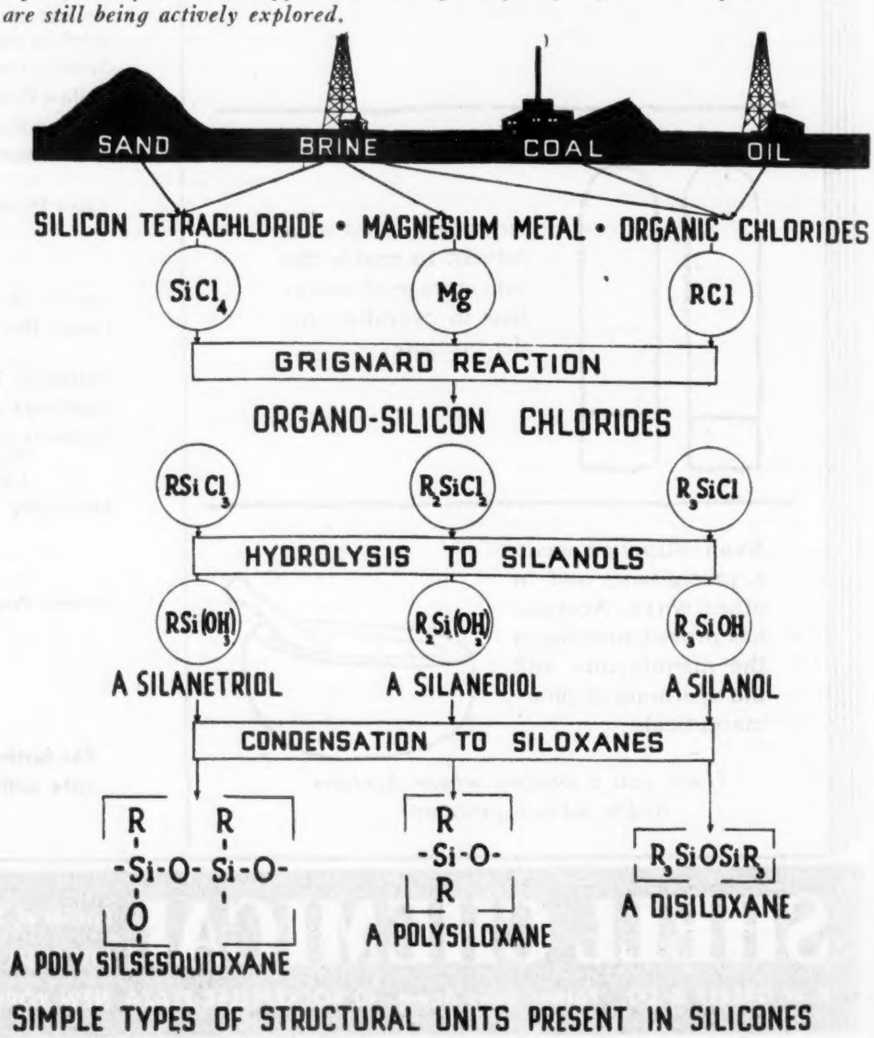
Thiophene is a heterocyclic sulfur compound with the formula C_4H_4S:



It is a colorless liquid, b. p. 84° C., with an odor resembling that of benzene. It is similar to benzene, too, in its reactions; and since dyes, pharmaceuticals, plastics and a host of other chemical

Synthesis of Silicones

Transformation of the basic raw materials—sand, brine, coal, and oil—into silicone resins is shown in the sketch below. Silicone resins, both solid and liquid, have found wide application during the past year, and their possibilities are still being actively explored.



SIMPLE TYPES OF STRUCTURAL UNITS PRESENT IN SILICONES

commodities to a large extent are derived from benzene and its compounds, commercial thiophene will enable the chemist to prepare many of these products which differ in that they will contain the thiophene ring in place of the conventional benzene ring. This fact presents numerous opportunities for altering the characteristics of many products such as the color of dyestuffs, the physiological effects of medicinals, the hardness, elasticity, brittleness and many other properties of plastics.

Under suitable reaction conditions, thiophene also reacts with aldehydes, particularly formaldehyde, to form thermosetting resins. In this respect, the behavior of thiophene may be likened to that of phenol in the preparation of thermosetting resins of the phenol-formaldehyde type, although there are important differences. Nevertheless, in the condensation of phenol with aldehydes, under suitable reaction conditions, it is possible to replace phenol with thiophene in any proportion.

Socony-Vacuum plans to make samples of thiophene available to serious investigators in order that its potentialities may be explored. The raw materials from which it is made are plentiful and the process of manufacture is such that the product can be ultimately priced to make it commercially attractive in those fields where its usefulness is demonstrated.

In the past small quantities of thiophene have been made available for laboratory work by intricate and costly chemical synthesis. The price previously quoted for this material is approximately $54.00 per pound.

Socony-Vacuum is operating a small laboratory pilot plant unit, and a larger pilot plant is being constructed having a capacity of several barrels per day.

New Dibasic Acid

The development of a new dibasic acid has been announced by the Heyden Chemical Corporation, 393 7th Ave., New York 1, N. Y.

This new product, known as M. D. A., is a technical grade of methylene disalicylic acid (dihydroxydiphenylmethane dicarboxylic acid). It consists of a mixture of isomers, principally the *para-para*. In addition, other isomers as well as small amounts of low molecular weight polymers are probably present.

An interesting and significant chemical property of methylene disalicylic acid is the combination of the reactive carboxylic acid groups with the phenolic groups in the same molecule. By this combination it would be expected that the versatility of the alkyd type resins would be combined with the chemical resistance of the phenolic types.

Such an expectation is borne out by experiments in the Heyden laboratories. For example, it has been found that alkyd resins made with M. D. A. and a pentaerythritol alcohol overcome the poor alkali resistance of ordinary alkyds. According to the company, when varnishes are formulated with these resins, the resulting products are improved rapid-drying protective coatings.

M. D. A. may also be used with rosin and pentaerythritol alcohols to produce modified phenolic resins which can be cooked into varnishes by the usual methods to produce fast drying paints and varnishes of improved chemical resistance.

Because of the tight supply positions of other dibasic acids, M. D. A. is of special interest at the present time to chemists working with alkyd and other resins, and drying oils for use in the manufacture of paints, varnishes, protective coatings, printing inks, linoleum and many other products.

Cellulose Acetate Fiber Improvement

Celanese Corporation of America, 180 Madison Ave., New York 16, N. Y., was granted a patent which relates to the improvement of the extensibility of stretched cellulose acetate or other cellulose derivative filaments.

According to this patent, cellulose acetate or other cellulose derivative filaments which have been stretched in the presence of steam or hot water are treated with an aqueous solution of a swelling agent for at least five minutes to insure substantially uniform treatment of the filaments throughout their cross-section.

The solution should be of such concentration that it has no tendency to shrink the filaments being treated, for example, a 5 to 30 per cent aqueous solution of acetone, and the treatment is carried out at a temperature not exceeding 60° C., the filamentary materials being finally washed and dried.

This treatment results in a marked improvement in the extensibility of the filaments without any material loss in tenacity.

Improved Wood

A new material which will provide competition with plastics and light metals in the fabrication of strong, light-weight parts has been developed by the U. S. Forest Products Laboratory, Madison, Wis., and given the name "staypak."

Staypak is a heat-stabilized high-density product made by compressing either solid wood or many layers of thin veneers. The material contains no resin except, in the case of the laminated product, normal amounts of resin adhesive to bond the veneers during pressing.

This material is an outgrowth of the metal shortages encountered in early stages of the war production program. Under the stimulus of military demands for modified woods to serve primarily in aircraft production, the Laboratory developed compreg—modified wood without

normal wood's tendency to swell and shrink, much harder than normal wood, moisture-resistant, and also notably resistant to chemicals, insects, and decay. Compreg, however, because it is a combination of wood and synthetic resin, exhibits some of the characteristics of the contained resin. Although most of its strength properties are high, it is more brittle than the original wood.

Because of this characteristic, the need for a compressed, stabilized wood without the embrittling resin was recognized.

As staypak is not in commercial production, its post-war uses can only be predicted on the basis of its known properties and on the fact that it is cheaper to manufacture than improved woods that contain considerable synthetic resin. Its high impact strength suggests any use requiring toughness, hardness, and other high strength properties together with good stability.

Details of manufacturing conditions of staypak are contained in a report (No. 1580) available on request at the U. S Forest Products Laboratory, Madison, Wis.

Halogen Compounds

A number of aliphatic halogen derivatives is being offered in commercial quantities by the Columbia Organic Chemicals Company, Inc., 600 Capitol Place, Columbia, S. C., for use in organic syntheses:

Active amyl bromide (2-methyl-1-bromobutane) is a colorless liquid, insoluble in water and boiling over a 2° range. It is supplied free of alcohol, olefins, or water.

Tetradecyl bromide and *sec*-heptyl bromide are two other alkyl bromides offered. The former contains less than 5 per cent dodecyl and cetyl bromides, and the latter is prepared pure from methyl amyl carbinol.

Two polyhalogen compounds offered are *a*-heptachloropropane and hexachloropropylene. The latter is said to be useful for the manufacture of organic trifluorides.

A mixed halide, trimethylene chloroiodide, contains two halogens of different activity and is made from trimethylene chlorohydrin.

Welding of Glass

The fabrication and maintenance of glass equipment will be simplified by a new process recently described in *Product Engineering,* 330 W. 42nd St., New York, N. Y.

Fabrication of hard, heat-resistant glass has been simplified and speeded up by use of high-frequency electric current passing through the glass between two gas flames on opposite sides of a glass part. This method is used for sealing glass tubes together, much the same as steel pipe is welded.

It has been demonstrated that workmen can install glass piping in place by freehand manipulation of hand torches feeding both flame and high-frequency current to edges of pipes to be joined. Operators have been trained in less time than metal welders.

Equipment for this work is comparable in size to welding units. It is anticipated that portable units will be available after the war. With this equipment it may be possible also to work with flat glass in much the same manner as steel plate is cut and welded into any desirable form.

Alkyl Bromides

Halogen & Perfume Chemicals, 616 King St., Columbia, S. C., announces the production of *normal*-hexyl, -octyl, and -decyl bromides for research and manufacturing purposes. These three alkyl bromides are produced from the corresponding alcohols with sodium bromide and sulfuric acid, and are clear, water-white, pleasing in odor, and valuable as intermediates in many organic reactions. Special precautions are taken in purification to render the final product as free as possible from alcohol and therefore to make the halide especially suitable in processes hindered by the presence of alcohols.

New Phosphorus Chemicals

Monsanto Chemical Company, St. Louis, Mo., has announced that it plans volume production of several metallic phosphates after the war.

One of these, aluminum metaphosphate, is useful as a component of glass which transmits a greater proportion of ultraviolet radiation than ordinary glass. Optical, electrical, and mechanical properties are also claimed to be superior.

A white pigment, tetralead pyrophosphate, and a source of iron to enrich foodstuffs, ferric orthophosphate, are also scheduled for production.

Galvanizing Process

Galvanized steel storage tanks and other chemical equipment will be rendered more useful, it is claimed, by the Galv-Weld process, announced by Galv-Weld Products, 333 E. 2nd St., Dayton, Ohio.

This method makes it possible to regalvanize welded seams and joints in galvanized sheet, plate and pipe.

New post-war products may be designed to utilize galvanized sheet metal for the first time, now that arc and gas welding, in place of riveting and soldering, have been made practical by this process, for it makes available to post-war designers the advantages of all-welded galvanized steel construction by

providing 100% protection against rust and corrosion at the point of weld. Painting is thus unnecessary as the mill galvanized coating together with the protection of the welds by Galv-Weld Alloy offers the greatest possible resistance to corrosion.

Manufacturers of equipment used in oil, meat packing, rendering and process industries can profit by lower manufacturing costs and a superior product by employing this new protective measure. Structures formerly requiring hot-dip galvanizing after full or partial fabrication may now be constructed from mill galvanized sheets and strips. Galvanized piping may also be welded to provide leakproof and rust free construction not previously always attained by the threaded joint. Commercial galvanizers are finding Galv-Weld Alloy saves considerable time and money in repairing rejects that otherwise would normally be stripped and re-hot dipped.

New Test Procedure For Wood-Treating Materials

With increased attention being paid to the use of toxic coatings to preserve wood against the destructive action of fungi, bacteria, and insects, the National Research Council of Canada has developed a new method for the quantitative comparison of the effectiveness of various protective coatings. The new technique is claimed to be more rapid and reliable than those previously employed.

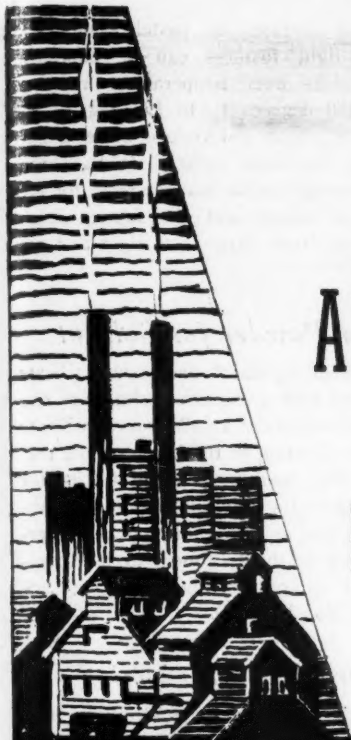
Older methods have embodied field tests wherein treated posts of blocks were buried outdoors for months or even years, and examined after the exposure period to determine the degree of decay. Or, as an alternative, laboratory tests consisting of bringing the toxic chemical in contact with a fungus culture and observing the resultant effect, were carried through. The former involves lengthy test periods; the latter does not duplicate completely conditions experienced in practice.

The Council procedure entails the use of twenty thin wood strips, ten of which are treated, and ten left untreated, as controls. The impregnated samples are buried in moist, composted, warm (28 deg. C.) earth, rich in bacteria and fungus, for a period of 28 days. The degree of decay, and conversely the effectiveness of the protective coating, is determined by measuring the breaking strength of the exposed pieces—in tension—and expressing this value as a per cent of the breaking strength of the unexposed samples.

New Color by Eastman

Tennessee Eastman Corporation has announced a new yellow in its LF series, dyes with particular fastness to sunlight.

The new dye, Fast Yellow 4RLF, produces bright golden shades of yellow on



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PALMALENE

A NEW PALM FATTY ACID OF MEDIUM TITRE, SYNTHETICALLY MADE

Palmalene's specifications (see below) make it suitable for many uses. It is excellent as a replacement for Stearate Acid in rubber compounding; and is especially suitable for textile specialties, soap making, alkyl resins, wetting agents, cosmetics, kier assistants, driers, pulp manufacture and paper manufacture.

PALMALENE SPECIFICATIONS

Saponification Number	180-185
Iodine Value	55-60
Titre	35

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Acetate of Soda
Acetone C. P.
Butyl Alcohol—Butyl Acetate
Methanol—Methyl Acetone
Methyl Acetate
Formaldehyde
Denatured Alcohol
Turpentine—Rosin
Benzol—Toluol—Xylol
Sodium Benzoate U. S. P.
Benzaldehyde { Technical- / N. F. F. F. C.
Whiting
Magnesium Carbonate
Magnesium Oxide
Precipitated Chalk

Anti-Freeze—Methanol and Alcohol

cellulose acetate. In pastel shades, 25 to 44 light fastness can be obtained, 4RLF dyes over temperatures ranging from 160 degrees F. to 190 degrees F. It leaves cotton and viscose white and is suitable for cross dyeing. It has been recommended by the manufacturer for the dyeing of drapery and other fabrics which require extreme fastness to light and gas fading.

Filter Powder for Solvent

Synthetic hydrated magnesium silicate is treated with an aqueous solution of one percent or more of an alkali metal silicate to cause fixation of the latter on the material. The resulting product is dried for production of a pulverulent product, suitable for use as a decolorizing and filtering agent in the treatment of used drycleaners' solvent or other liquids. U. S. Patent No. 2,353,970.

Electronic Vulcanization

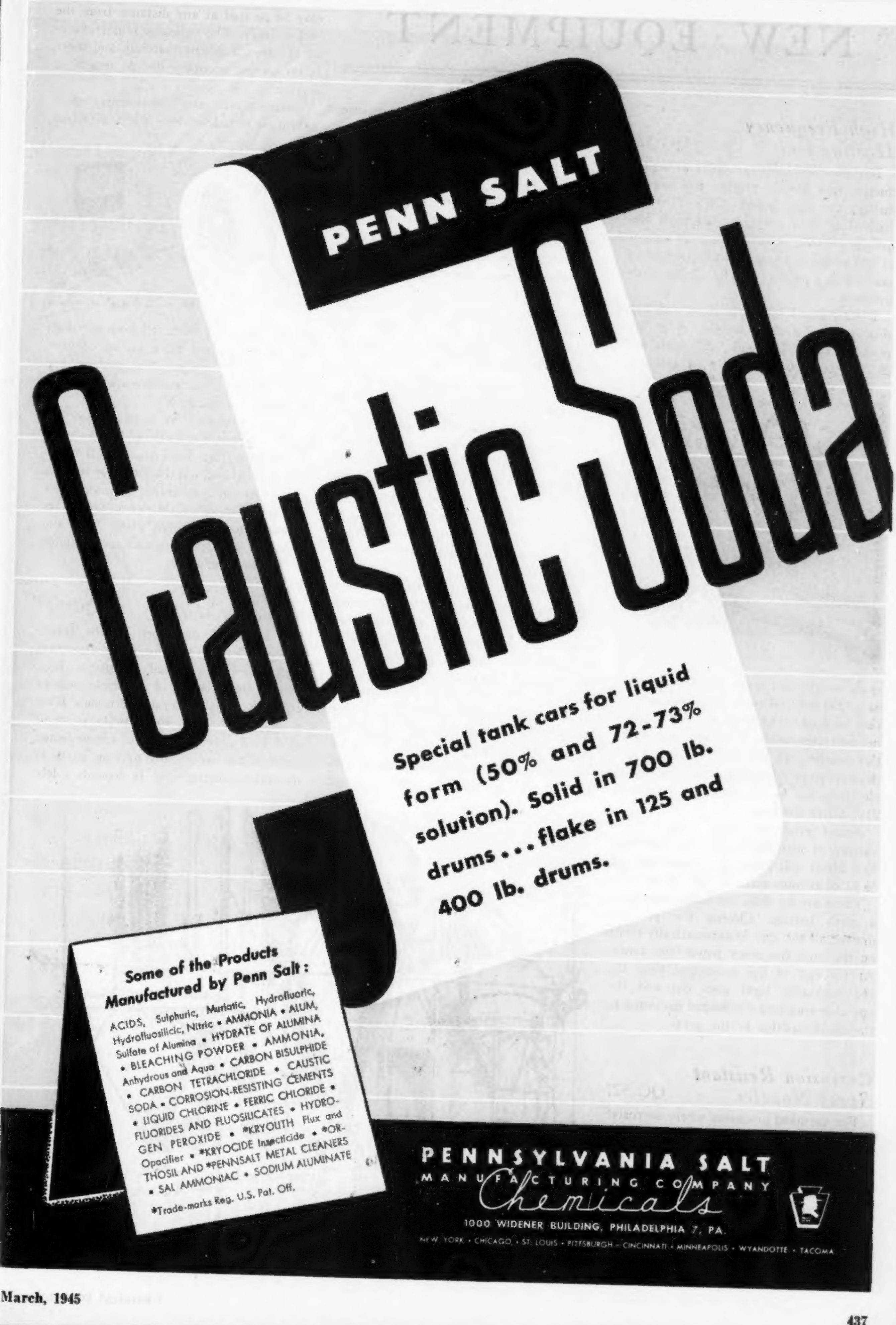
Basic patents covering electronic vulcanization of rubber and other materials have been purchased by The B. F. Goodrich Company and The Firestone Tire & Rubber Company.

For more than a century, rubber has been vulcanized by applying heat to the outside surfaces. Since rubber insulates against rather than conducts heat, heating of rubber products to their core was slow and lacking in uniformity. Plastics also do not readily conduct heat, and molding them has presented similar difficulties.

In electronic vulcanization, high frequency oscillations create uniform heat throughout the product being vulcanized in a fraction of the time required when steam is used. The same uniform heating removes difficulties in the molding of thick plastic products. Electronic heating also makes possible the use of simplified equipment.

Modifier for Synthetic Rubber

A Durez thermosetting phenolic resin has been formulated which possesses the very useful characteristic of softening synthetic rubber during the milling or processing of semi-hard and hard rubber compounds. Because of the peculiar stiffness of synthetic rubber as compared with that of natural rubber during such processing, it has been extremely difficult to add sufficient loading during milling to produce the semi-hard and hard rubber stocks. In the production of these stocks from natural rubber this loading with reinforcing materials such as carbon black was not a problem because of the natural plasticity of the rubber on the mill. The Durez resin, being thermosetting and completely compatible with the synthetic rubber, also reinforces the rubber in much the same manner as carbon black.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NEW EQUIPMENT

High Frequency Heating Unit QC 526

Designed and built especially as a production unit for the plastics molding industry, the new model X875 Thermex Red Head is a very compact high frequency heating unit. Having an output of 400 watts, this automatically controlled machine is a product of The Girdler Corporation.

Distinguished by its brilliant red top, this new Thermex weighs only 250 pounds and is 15" wide, 23" high and 29" deep. It will actually fit into the space usually left between presses. Ordinary 230-volt, 60-cycle single-phase current is used. The built-in heating cabinet and removable 7" x 10" tray make this machine an extremely practical and flexible piece of equipment. The upper electrode can be adjusted to a height of 2¼" above the tray.

Actual production tests over a wide variety of materials show the Thermex Red Head will raise the temperature of ⅓ lb. of average material 170° F. per min.

There are no dials, no tuning, nor even a push button. Closing the preform drawer all the way in automatically turns on the high frequency power and timer. At the end of the prescribed time the red indicating light goes out and the operator transfers the heated preforms to the mold cavities in the press.

Corrosion Resistant Spray Nozzles QC 527

For chemical processes where corrosive liquids are handled, this "Fulljet" spray nozzle typifies a complete line of suitable spray nozzles made by Spraying Systems Co., Chicago, Ill. The "Fulljet" nozzle is made of hard rubber with removable internal vanes. It sprays acids and other corrosive liquids to form a full cone spray pattern with uniform distribution. Degree of atomization of the liquid sprayed depends on nozzle capacity and pressure used.

Spraying Systems nozzles for corrosive liquids are built to perform to exacting specifications. For any given liquid pressure, they spray at predetermined capacities and rates of flow as well as at specific spray angles. In this way, the various sizes and types of these corrosion resistant nozzles meet the exacting needs of practically any process.

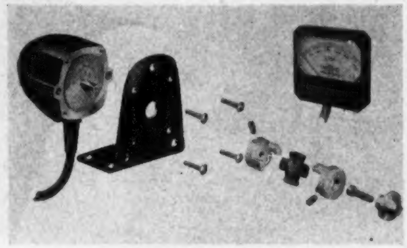
Besides hard rubber, "Fulljet" nozzles are also available in lead or plastics for applications in which the first material may not be suitable.

Speed Indicator QC 528

Visual speed indication is provided by a sturdy, accurate, low-cost electric indicator, developed by the Reliance Electric & Engineering Co., Cleveland, making it possible to determine and to set proper operating speeds in a broad new field of applications, where the installation of such instruments was heretofore not economically feasible.

The Reliance Electric speed indicator, which gives accurate readings of speeds from 100 rpm to 5000 rpm, consists of two units. The pick-up unit, a miniature six-pole alternator with a permanent magnetic rotor, is mounted on the shaft whose speed is to be measured. The indicator, a permanent magnet, moving-coil type, meters the pick-up output on a 3¾" scale which covers 95° of arc. The resistance of the indicator has been made sufficiently high so that the size or length of the leads connecting the units will have no effect on accuracy, and the indicator may be located at any distance from the pick-up unit. The indicator is not affected by other magnetic material, and there is no loss of accuracy due to length of service.

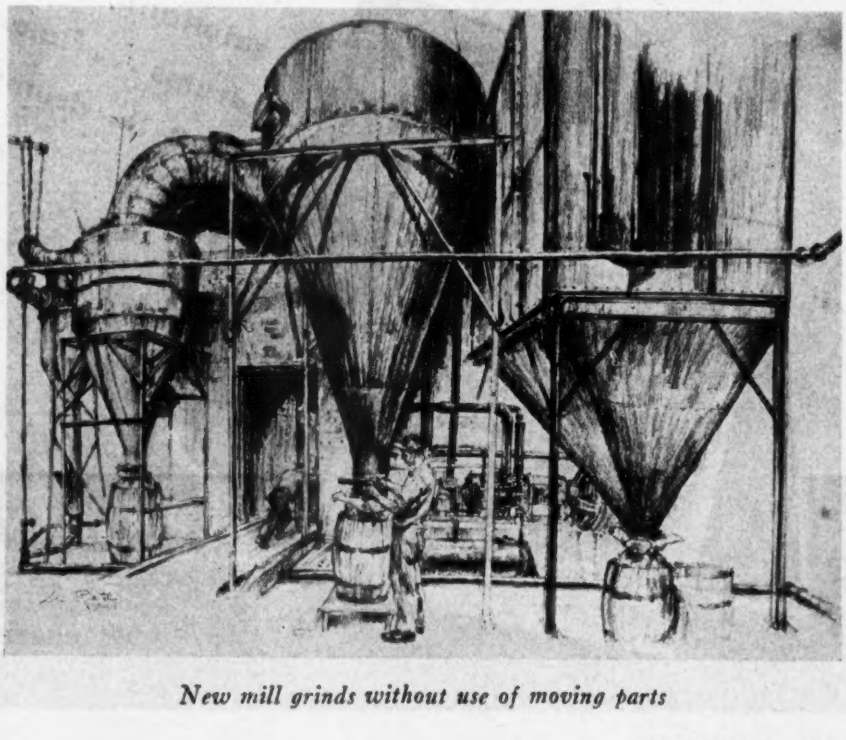
Instantaneous and continuous speed indication is independent of the direction of rotation of the shaft. Pick-up windings are stationary, and there are no commutators or slip rings. No conduits are required, and lifetime lubrication further simplifies maintenance.



Special attention to flexibility of use has been given, too, in the physical design of the indicator. Fool-proof shaft coupling is provided, and the indicator may be bracket or panel mounted. Indicators are provided for full-scale deflection corresponding to 1500, 2000, 2500, 3000, and 5000 rpm, and special scales are available to read in other units.

Grinding Mill QC 529

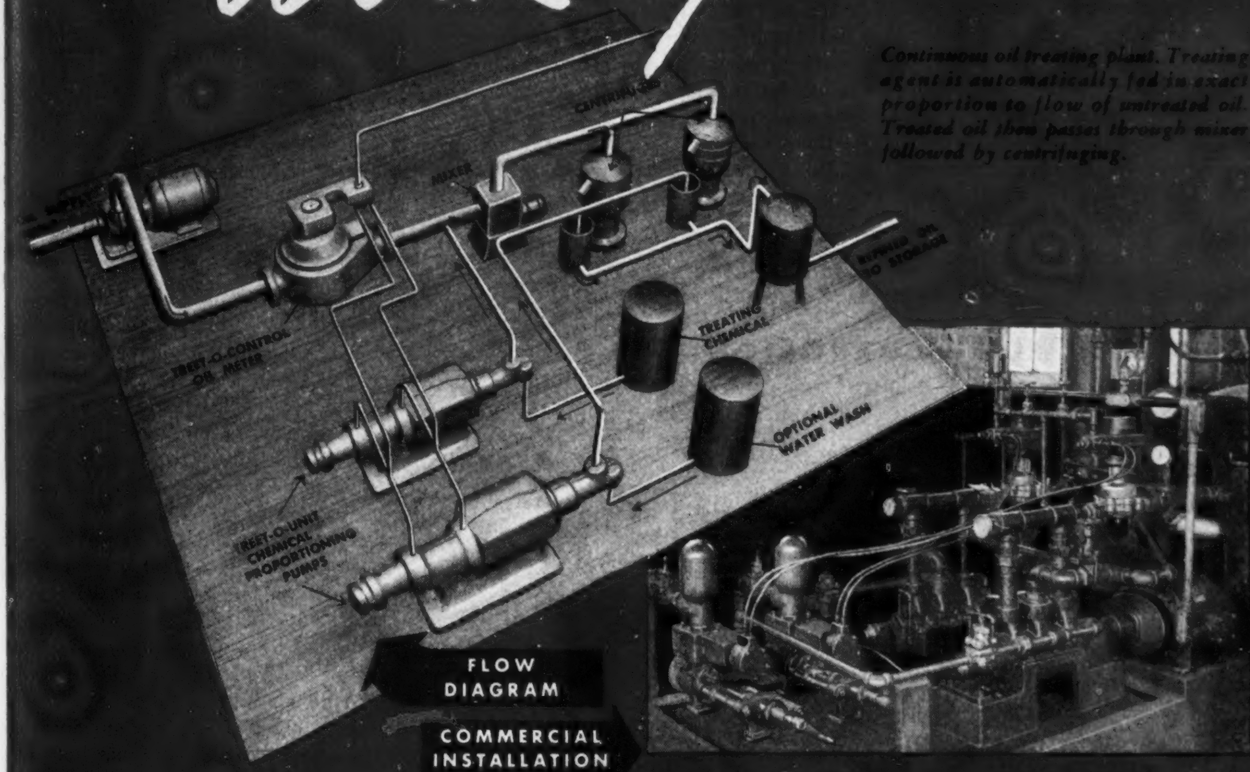
A new mill, developed by the International Ore Corporation in collaboration with the Eagle Pencil Company, Inc., permits the grinding of materials such as graphite, iron, minerals, Prussian blue, grain, and the like, to particles as small as 1 to 2 microns. This is accomplished without the use of any moving parts in its entire construction. It depends solely



New mill grinds without use of moving parts

A *Working* PRINCIPLE

Continuous oil treating plant. Treating agent is automatically fed in exact proportion to flow of untreated oil. Treated oil then passes through mixer followed by centrifuging.



FOR CAUSTIC OR ACID TREATMENT OF OILS PRIOR TO CENTRIFUGING

Continuous
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The *principle* of continuous, automatic proportioning is *working* in this %Proportioneers% flow responsive system for treatment of oils. Automatic, accurate and flexible in application, this Treet-O-Control system is *working* with spectacular success.

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on the action of a gentle flow of particles carried by a medium of air in an extremely long pipe, the inlet of which is under pressure and the outlet end under suction.

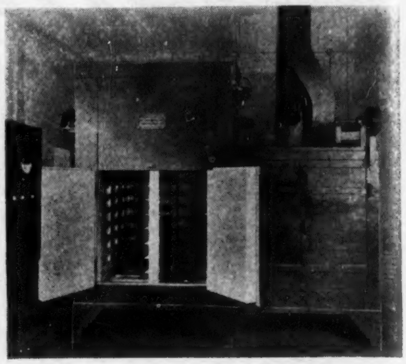
The inlet and outlet ejectors are operated in such a fashion that the material near the axis of the pipe moves faster than that near the wall. This differential movement results in an attritive action. The process is completely automatic and requires no attention.

Several advantages over the usual types of milling are claimed for this equipment. The inner structure of materials is not disturbed by impact nor by local heating effects inherent in grinding processes. Any predetermined micron size can be achieved, and the material is broken along natural lines of cleavage.

Drying Oven QC 530

The Industrial Oven Engineering Company has developed a standard box-type oven for the high-speed evaporation and drying of highly volatile solvents. It is a self-contained unit, with all heating equipment and ductwork built into the oven shell, and is either shipped assembled ready to operate, or is shipped in prefabricated sections for quick assembly at the point of operation.

Door sizes range from 3 feet wide by 3 feet high to 5 feet wide by 6 feet high, and working depth from 3 to 6 feet. The temperature range is from 150° to 900° F., with a tolerance of ±2°. Despite the fact that the oven is direct gas fired, a seeming hazard in the evaporation of



large volumes of inflammable and explosive materials, it has been proved perfectly safe and has insurance company approval.

The oven illustrated is a standard size (4-foot by 5-foot door and 4-foot depth) with a preheating zone added, the latter heated by exhaust air from the oven proper. It is used to dry fabricated paper parts which have been dipped in a finishing solution consisting of approximately 50 percent alcohol and 50 percent solid matter. On this job it has reduced drying time from 25 minutes to 5 minutes, has cut drying costs substantially, and has increased hardness of the finish, at the same time relieving brittleness which was previously a characteristic of the finish.

These ovens can be used not only for alcohol but for acetone, naphthas, methyl ethyl ketone and many other highly volatile solvents, and can also be converted without delay for other types of drying, finishing, heat treating or heat processing where materials can be handled in trays, jigs or baskets. It is especially suited to dense loads where air stream resistance is high. Completely automatic controls, of the expansion recording thermometer type or the millivoltmeter type, either air or electrically operated, are supplied to suit the user.

Lubrication Pump QC 531

Recently announced by The Farval Corporation, Cleveland, Ohio, is the automatic central pumping unit DC-25. This is a small size, double plunger, slide valve type of pumping unit which provides a positive high pressure pump for the handling of all types of lubricants without the use of springs, check valves or stuffing boxes. The complete system will handle either oil or grease and requires no attention except the renewal of the lubricant supply in the reservoir.

Similar to the larger Farval heavy duty units, the DC-25 central pumping unit delivers lubricant under pressure to all bearings in the system through two main supply lines serving a Farval Dualine measuring valve at each bearing. Frequency of operation is controlled by an

electric time clock. A suitable signal device is available to indicate any interruption to the normal operation of the system. For individual machine lubrication, this central pumping unit can also be furnished with rotary drive and with hydraulic timing. With this arrangement, the unit will start and stop with the equipment served.

Dust Collector QC 532

Manufactured in four sizes, the Dustex portable dust collector is designed to meet the need for an efficient and economical means of removing dangerous and obnoxious dusts from the air. It is built by the Dust Filter Company.

The principle underlying the unit is the compound action on the air-borne dust: first, by centrifugal separation from the air stream, and second, by impingement

on the filter surface. It maintains constant static air suction of more than 4" at velocity of over 5000 CFM and is completely fireproof. Units weigh from 75 to 200 pounds; are 30 to 51 inches high.

The Dustex separator successfully collects the most minute dust particles. The filter assembly consists of two corrugated layers of wire mesh covered with 60-mesh filter cloth. Filtered air is discharged through a muffler to deaden air noise.

Mercury Dry Cell QC 533

A new type dry cell which employs mercuric oxide as the negative agent has been developed by Samuel Ruben and licensed to the P. R. Mallory Company, Indianapolis.

One of these batteries, the cells of which are three-eighths of an inch long, is said to develop as much power and will operate five times as long as a standard flashlight-type battery of comparable size.

The ordinary cell consists of a zinc can,

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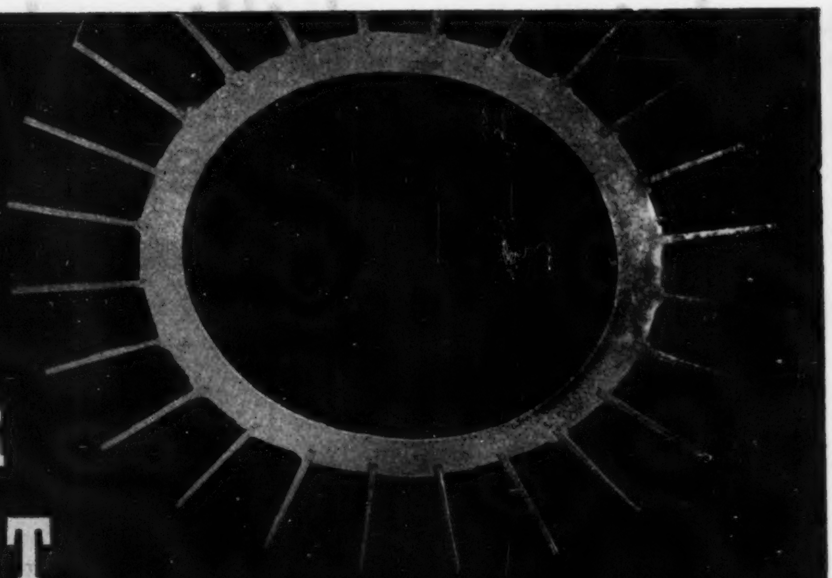

Is each unit adaptable, interchangeably, for heating, cooling, condensing, heat exchange? Does it function equally well under either low or high extremes of temperature and pressure . . . and with fluids of low heat conductivity or high viscosity?

Twin G-Fin Sections do all these things so remarkably well, that today, more than 40,000 Twin G-Fin Sections are serving in industries of practically every type.

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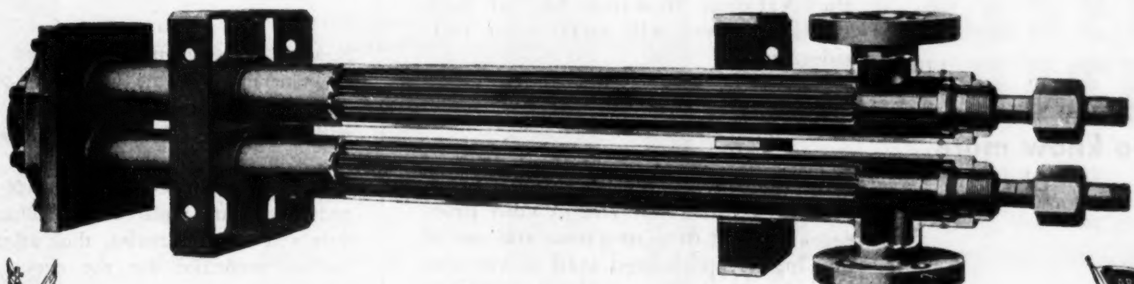

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GRISCOM-RUSSELL TWIN G-FIN SECTION

The Universal Heat Exchanger

which serves as the negative pole, containing a mixture of ammonium chloride and manganese dioxide into which is imbedded a carbon rod, which acts as the positive pole. The new cell uses a steel can, the positive pole, which contains a spiral of zinc and paper impregnated with mercuric oxide. A zinc button is the negative pole.

Although it is more expensive than the conventional type, it is expected to find a market where small size and long life are more important than price. An Army battery, for instance, contains 72 cells in a tube less than 12 inches long and 1½ inches in diameter and develops 93.6 volts.

It is not expected to compete in the ordinary, cheaper flashlight-battery field.

Fog-Free Goggles QC 534

Welsh Manufacturing Company, makers and distributors of various types of eye protection devices, announce a new fog-free, dust-free goggle.

In this goggle, normal breathing has been harnessed to provide a natural ventilating pump for the goggle. Normal breathing sweeps a complete change of air, about once every second, through

flow channels in the frame and cross the inner face of the big single plastic lens. This action removes moisture from within the goggle before it can condense as fog or frost on the lens.

The air intake ports contain felt filter pads which are replaceable, to filter out dust and flying particles, thus affording further protection for the eyes.

Electronic Control QC 535

Introduction of electric contact controls for circular chart electronic potentiometers is announced by the Brown Instrument Company.

The electric contact controllers will be available in two forms. One will contain a locking-in type relay, designed primarily for electric furnace control. It can also be used for applications involving use of contactors and for processes requiring a differential gap.

The second type, without a relay, is

designed for direct control of motorized valves, operation of signalling devices, and for applications requiring a "dead" neutral.

The electric contact control mechanism, according to engineers of the Brown company, will be available for circular potentiometer pneumatic controllers. It will serve, when applied to these instruments, as an auxiliary switch for operation of signal lamps and other devices.

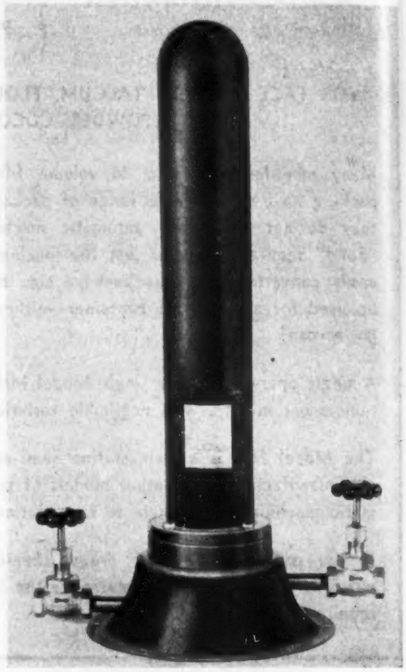
Oxygen Removal From Gases QC 536

A newly developed gas purifier utilizing palladium as a catalyst, together with a supplementary portable analyzer now being perfected, is announced by Baker & Company, Inc., Newark, N. J.

The company claims that this new unit, named the Deoxo purifier, has shown in laboratory tests and also under practical working conditions its efficiency in removing oxygen from such gases as hydrogen, nitrogen, argon and neon. Gases of extremely high purity, that is, with less than 20 parts of impurity in a million, are thus obtainable, it is claimed. It operates at room temperature.

While uses of the new development are manifold, the company cites especially the manufacture of radio and radar tubes. It is also important to heat treatment of alloys, powder metallurgy, and all research laboratories using pure gases.

The unit will be produced in two sizes. Both are compact, containing the catalyst encased in metal cylinders provided with intake and outlet valves through which the gas is passed. One, standing 20 inches high, is designed for laboratory and limited production use. It has a capacity of 200 cubic feet of gas per hour and is being prepared to sell at $225. The other,



for general plant operation, costing $475, measures 40 inches high, and is constructed for wall mounting. Its capacity is 1,000 cubic feet of gas an hour. Both units will handle pressures up to 50 pounds per square inch. It is claimed that in each device maintenance costs are nil under ordinary conditions.

The portable analyzer being perfected as an adjunct to the new purifier will indicate continuously the hydrogen or oxygen impurity.

Dipping Tank for Coating Tools QC 537

To meet demand on the part of tool and die users for dipping equipment for plastic skin coatings, the Aeroil Burner Company of West New York, New Jersey, has just designed a small Tool Room model hot-dip tank.

This new model, known as the Plant-O-Dip Model 3, is built on the double-boiler principle and is electrically heated by means of a 1200-watt specially designed immersion element encased in a liquid-proof cover with heating coils sealed within steel blades. This element delivers heat into an oil bath which completely surrounds the inner vat containing the compound, thus providing indirect heat.

The temperature of this hot oil bath is rigidly controlled from 100° to 550° F. by a built-in housing containing a thermostat with knob dial and pilot light.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

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Please send me more detailed information on the following new equipment.

QC 526	QC 529	QC 532	QC 535
QC 527	QC 530	QC 533	QC 536
QC 528	QC 531	QC 534	QC 537

Name . . . . **(Position)** . . . .

Company . . . .

Street . . . .

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

Palletizing With Glue

A special quick-setting, mold-proof glue for palletizing corrugated or solid fiber shipping containers has been developed by National Adhesives in collaboration with the Army Quartermaster Corps.

T. Pat Callahan

A special gluing system has also been developed which is now being tested by the armed services. The gluing of pallet loads extends the practical application of palletizing to a greater number of shippers since it permits those without mechanical handling equipment to assemble loads for shipment without the use of steel straps. National's Pallet Adhesive #4 provides adequate protection against all the stresses of freight handling, preventing the slippage of inadequately anchored items and eliminating the need of reassembling broken loads.

The accompanying Official U. S. N. Photo shows a freight car containing glued pallets being unloaded at Bayonne Naval Supply Depot.

An official United States Navy photograph illustrating the handling of unit loads palletized with glue. A test freight car is being unloaded at the Bayonne Naval Supply Depot.

Metal Barrels and Drums

Some time ago we discussed the Series of I. C. C. 5 Specification metal barrels and drums, and in this issue we shall discuss I. C. C. Specification 6 for the same containers.

The I. C. C. 6 Series of metal drums is generally used to pack dry or solid materials where it is necessary to have full open-head drums from which such contents may be removed. Particular uses of this series of drums are found in the packaging of a great number of inflammable solids and oxidizing materials such as nitrocellulose, phosphorus and phosphorus compounds. The series of I. C. C. 6 Specifications includes I. C. C. 6A, 6B. 6C and 6J. As the I. C. C. 6A, 6B and 6C are the most generally used, we shall discuss these three specifications only, because the I. C. C. 6J, while a part of the Specifications and permissible for a few products, is not a generally used container in the industry.

These drums follow the master specification of the I. C. C. 5A drum closely except that it is not a requirement that the body seams be welded or the head and chime seams be welded or double seamed, or the flanges for closures be welded in place. Also the particular specification for closures as specified under the I. C. C. 5A is not a requirement for the 6 Series. It is suggested, however, that in any drums of the 6 Series which may be over 30-gallon capacity, the welding provision, although not a part of the Specification, be insisted upon by the purchaser of these drums.

The I. C. C. 6A is obviously a better drum than the others in the series, and it differs from the 6B and 6C in that the other drums may be constructed of lighter materials; i. e., the 6B may be constructed of lighter material than the 6A and the 6C of lighter material than the 6B.

The closure specification for the 6 Series of drums reads that removable head containers which will pass all required tests are authorized. The required tests are most important and are the same for the 6A, 6B and 6C drums. As the safe use of a drum using a full open head is dependent upon its ability to stand the required tests, we quote from the I. C. C. Specifications:

"Test by dropping, filled with dry, finely powdered material to the authorized gross weight, from height of 4 feet onto solid concrete so as to strike diagonally on top chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond the chime or rolling hoops must also be capable of withstanding this test.

"Hydrostatic pressure test of 30 pounds per square inch sustained for 5 minutes. Leakage through closure shall not constitute failure.

"*Leakage Test.*—Each container shall be tested with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch; leakers shall be rejected or repaired and retested; removable head containers not required to be tested with heads in place except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months; samples, so tested, must be retained until further tests are made."

ICC Regulations Amended

The Interstate Commerce Commission Regulations were amended on January 25, 1945, and we list below those amendments which are of particular interest to the chemical industry.

The following addition was made to Section 154a:

"(Add) 154a. Aluminum dross must not be shipped when hot or when containing moisture liable to cause heating or fire during transportation."

An addition was also made to Section 160a:

"(Add) 160a. Calcium hypochlorite compounds, dry, containing more than 8.80 per cent available oxygen (39 per cent available chlorine) must be packed in specification containers as follows:
Spec. 6a, 6B, or 6C.—Metal barrels or drums.

Spec. 17E, 37D, 37E, or 37F.—Metal drums (single-trip).
Outside packages, containing inside containers of glass or metal, not over five pounds capacity each, are exempt from these regulation."

Section 166a was amended to read:

"166a. Cobalt resinate, precipitated, calcium resinate, and calcium resinate fused, must be packed in specification containers as follows:

An addition was made to Section 175a as follows:

"(Add) 175a. Magnesium scrap (shavings, borings, or turnings), when shipped in car loads or truck loads, must be packed in tightly and securely closed metal barrels, wooden barrels, metal pails, or four-ply paper bags. In less-than-carload or less-than-truckload quantities it must be packed in tightly and securely closed metal drums, metal pails, or wooden barrels."

Section 264 (packaging hydrofluoric acid) was amended by changes in subparagraphs (b), (c), (h) (1), (h) (2), and (h) (3). The amendments are as follows:

"264(b) Containers must not be entirely filled. Unless otherwise provided herein, sufficient outage (vacant space) must be allowed so that the liquid portion will not completely fill the container at 130°F. in order to prevent leakage or distortion of containers due to the expansion of the contents from increase in temperature during transit.

"(c) Spec. 15A, 15B, 15C, 16A or 19A—Wooden boxes with inside containers of India rubber, ceresine, lead, or other hydrofluoric acid resistant materials. These containers are authorized only for strengths of acid for which they are adequate, but in no case may the strength of acid exceed 65 per cent.

"(h) (1) Spec. 5A—Unlined metal barrels or drums which have been subjected to adequate passification or neutralization process (see note). Authorized only for acid of not less than 60 per cent and not more than 80 per cent strength and all containers must be filled to not over 80 per cent of capacity at 68°F. If containers are washed out with water, they must be repassified before reshipment.

"Note. Each metal container, before being put into this service, must be passified by the following or an equally efficient method: By filling drum to 90 per cent of capacity with hydrofluoric acid of 58 per cent strength and allowing drum to stand 48 hours at a temperature of 80°F., and then 7 hours at 140°F., the internal pressure being maintained at atmospheric pressure by means of a ventilated bung.

"(h) (2) Containers not exceeding 55 gallons capacity each are authorized for carload, truckload, less-than-carload, and less-than-truckload shipment. Containers exceeding 55 gallons capacity each are authorized for carload or truckload shipments only but they must be loaded by consignor and unloaded by consignee.

"(h) (3) For less-than-carload or less-than-truckload shipments, containers must be of metal at least as heavy as 14 gauge United States Standard for not over 20 gallons capacity each or 12 gauge for not over 55 gallons capacity each. Each container must be subjected to at least one of the following tests before shipment: By interior pressure of at least 15 pounds per square inch before filling or by holding for inspection for at least 24 hours after filling. In either case, each container must be vented prior to shipment.

"Note. Because of the present emergency and until further order of the Commission, containers of not over 55-gallon capacity each, of 14-gauge metal, are authorized provided test requirements of this paragraph are maintained and provided containers are retired from service after showing a 15 per cent loss of tare weight."

Section 272 (packaging sulfuric acid) is amended whereby Specification ICC 103 type tank cars are authorized for the transportation of sulfuric acid not exceeding 98 per cent strength. This is a specification amendment granted upon application of the Office of Defense Transportation and is only effective on advice of carriers to the Office of Defense Transportation on the initials and numbers of the cars together with the number of cars to be used in this service and the point between which they will be operating.

Section 303 (n) (2) is amended (motor-vehicle transportation of liquefied petroleum gases in intra-state commerce) by the addition of the following regulations:

"(Add) Because of the present emergency and until further order of the Commission, non-ICC specification containers used for liquefied petroleum gases prior to June 15, 1943, under laws, rules, or regulations of the States in which they are located, and so long as they are maintained in safe transportation condition, are authorized for use in the transportation of those gases by common, contract, or private carrier by motor vehicle, in intra-state commerce only, within those States. All other requirements of the Commission for such transportation must be complied with. This authority does not apply to the cargo tanks of tank motor vehicles."

Section 303 (q) (1) is amended by the deletion of the following: ,

"(Delete) Liquefied petroleum gas (pressure not exceeding 45 pounds gauge per square inch at 105°F.)	ARA-IV, ICC-104, and ICC-104W, Note 16. Delete Note 16 to section 303 (q) (1)"

Section 303 (q) (1) was also amended by an addition to Note 8 extending test period on certain CWSX cars and certain SHPX cars to three years instead of two years as currently provided.

Note 12 of Section 303 (q) (1) is amended as follows:

"Note 12. Tanks complying with specification 106A500, containing chlorine, anhydrous ammonia, sulphur dioxide, methyl chloride, dichlorodifluoromethane, monochlorodifluoromethane, or monochlorotetrafluoroethane, may be transported on trucks or semitrailers only, when securely chocked or clamped thereon to prevent shifting, and provided adequate facilities are present for handling tanks where transfer in transit is necessary. See par. (b) (2), sec. 560, for rail freight-motor vehicle shipments."

The purpose of this amendment is to add chlorine and anhydrous ammonia to the existing permission to ship certain compressed gases in Specification 106A500 ton tanks on trucks.

Specification 3BN, Seamless Nickel Cylinders, is amended by deleting par. 10 requiring heat treatment.

Par. 5 Specification 37F is amended by the inclusion of the authorized gross weight of 275 lbs. for containers between 5 and 55 gallons to be constructed of 24 gauge material without welded side seam.

Specification ICC 103A, Section 14(a) is amended as follows:

"14. Safety vents.—(a) Safety valves prohibited, but a safety vent must be applied. Sulfuric acid, except oleum, mixed acid (nitric and sulfuric acid) (nitrating acid), and other fuming acids, may be transported in specification 103A tank cars having safety vents equipped with lead discs having ⅛-inch breather holes in the center thereof."

Part 7 of the Regulations applying to shipments made by way of common, contract, or private carriers by public highway (CFR85) has been amended. Section 824 Par. (g) (3) permitting the transportation of chlorine and anhydrous ammonia in addition to sulfur dioxide, methyl chloride, dichlorodifluoromethane, monochlorodifluoromethane, or monochlorotetrafluoroethane may be transported on trucks or semi-trailers only when securely chocked or clamped thereon to prevent shifting.

Fiber Containers Use Curtailed

A five per cent cut in the use of new fiber shipping containers for non-military purposes has been ordered by the War Production Board through amendment of Limitation Order L-317 (Fiber Shipping


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HOW TO REPEL
MOISTURE and
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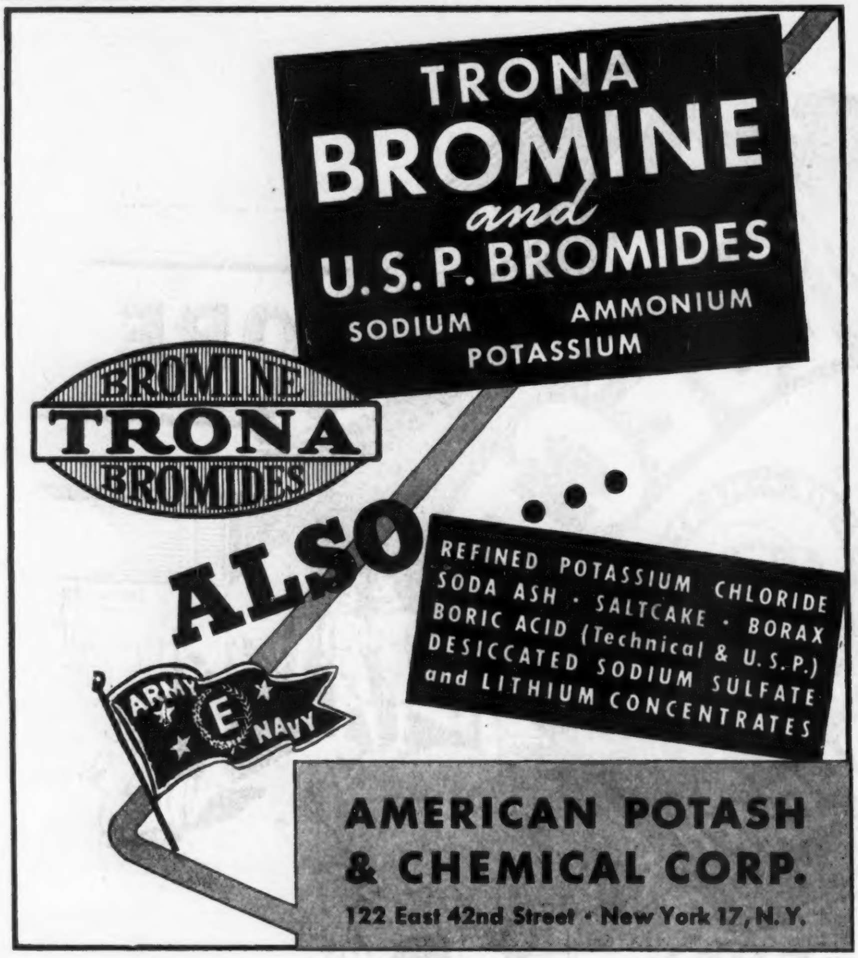

Containers; Manufacture and Use). The amendment limits the quarterly use of such containers to a number that will require only 95 per cent of the total containerboard (by both weight and area) in the containers lawfully used by a packer in the corresponding quarter of 1944.

"Sharply increased activity in the various war theaters creates an even heavier demand on cartons for military supplies, and this need can be met only by greater conservation at home," WPB officials said. The officials pointed out that containerboard requirements for V-boxes have increased almost 50 per cent since the first quarter of 1944.

The Amendment to Order L-317 is effective as of January 1, 1945. WPB announced that all grants of appeals under Order L-317 are expressly canceled by the amendment.

Under the amendment, the vast variety of Schedule III products (running from food to curtain rods) lose their separate carton quotas, as previously established in relation to a base period, and come under a blanket provision that limits a packer to a calendar quarter usage of 95 per cent of the containerboard content (in terms of both weight and square feet) legally used by him in the corresponding calendar quarter of 1944, or to 23¾ per cent of the total 1944 use. The amended order now provides that any unused portion of a quarterly quota may not be added to the next quarter's quota, and borrowing from one quarter to another is prohibited.

Shipping containers used for military purposes in 1944 must be excluded from the base upon which the packing quotas are computed; formerly such containers could be included. However, containers to be used for military purposes in 1945 are not chargeable to the packer's quota.

"Reshippers" are to be counted as "new" containers and must be included in the packer's 1944 base usage. They are chargeable to the packer's 1945 quota. Bona fide used cartons, however, remain outside the provisions of Order L-317. A "reshipper" is defined as any new container, made in whole or in part from solid or corrugated fiber, that contains empty inner containers (such as glass jars, cans, etc.) received by the packer, and which is then used by him for shipping inner containers packed by him with some product.

Some products that appear on Schedule III of the order for the first time include small agricultural equipment, anti-freeze liquids, commercial fishing equipment, office machinery, lubricating oils, and grease.

Carton specifications for meats and other packing-house products listed under Schedule IV are essentially the same as those previously established, but the former option of using 85 per cent of 1943 carton usage is revoked.

PLANT OPERATIONS NOTEBOOK

Value of Control

Actual comparative tests in your own plant can be of the utmost value in determining the worth of a device of almost any kind. Here, for instance, are the results of tests that were made by the engineers of one of the many plants using steam flow meters. A typical example follows:

	Without Meter	*With Meter*
Total duration of test	40 hours	40 hours
Feedwater used, pounds...	1,539,451	1,677,455
Feedwater temperature, deg. F.	91	91
Coal as fired, pounds	274,815	287,100
Steam pressure, average ..	137	137
Evaporation per pound of coal from and at 212 deg. F.	6.15	6.82

Analyzing these results we find that with the meter, which was installed on only two boilers whereas there were four boilers in all, the coal consumption during the four 10-hour shifts was 287,000 pounds, or a saving of approximately 14 tons on the two boilers equipped with meters. At $5 per ton of coal this saving would amount to a total of $70, or, a saving of $17.50 per 10-hour shift for two boilers or $8.75 per 10-hour shift per boiler.

Obviously, at this rate the meter pays for itself in from 8 to 10 days by effecting better evaporation per pound of coal. Usually a device of almost any kind that pays for itself in one year is considered a very good buy.

The above two boilers equipped with the meters were operated at 9 per cent overload. It is estimated that had they been running under normal load, as the other two boilers were, the saving would have been still greater. While one might not always be able to save 10 per cent, however, other tests and subsequent operation extending over a period of 60 days showed a saving of 8 per cent.

In the above tests the manufacturer of the meter had no connection whatever except to see that the meters were in proper operating condition. The running of the tests was left entirely to the firemen and engineers of the plant, and the data as quoted here represent the results obtained as shown by their own figures.

Cement Dusting Stopped

A new highly concentrated treatment for cement floors, etc., is said to provide coverage for at least 1000 square feet per gallon. Thus cost of a treatment is reduced to a small fraction of a cent per square foot.

This material, known as Synkrete Concentrate, is diluted with three parts water before use. Thus one gallon of concentrate gives four gallons of ready-to-use Synkrete.

In this form, Synkrete is easily applied by mop, brush, long handled broom, or sprinkler. It soaks deep into the pores of dusting concrete where it hardens to form a rocklike water insoluble mass that reinforces the binder and prevents surface particles from being worn away. After treatment with Synkrete, cement floors are far harder, much more resistant to traffic, water infiltration, oils, greases and chemicals. They are easier to maintain with less "drag" in sweeping. The effect of a treatment is lasting.

While a single coat of Synkrete will allay dusting, two or more are usually recommended for best results. The liquid is almost colorless and does not affect appearance of floors. When floors are to be painted later, a treatment with Synkrete acts as the perfect sizing, and the paint will last longer with less tendency to peel or blister.

Pipe Joints

White lead is carbonate of lead ground in boiled linseed oil. It is commonly used for preventing leakage through threaded pipe joints and is all right where pressures are not severely high and where pressures are not turned on too soon.

Red lead is an oxide of lead ground in boiled linseed oil. Red lead hardens a bit more quickly than white lead and it is preferable where pressure is to be turned on soon after the joints are made. White lead seems to be somewhat more durable than red lead, but as already stated, it must be given more time. When properly used and given ample time to set white lead is probably superior to red lead.

Some pipe men prefer graphite because of its lower coefficient of friction enabling the workman to do a better mechanical job; i.e., the threads can be made to seat better. Thus in one instance red lead was used on brass piping. It was decided to make a test by subjecting the piping to pressure and it was found that over 80 per cent of the joints leaked. The line was taken down, the threads were washed with gasoline, and then a graphite mixture was used. All leaking was eliminated.

Litharge is lead monoxide and is made by heating lead in a current of air. Litharge is excellent where quick hardening is desired and where a truly durable and tight joint is wanted. The writer has used it with good results on ammonia lines. It hardens more quickly than does red lead, but of course it does not possess the low coefficient of friction of graphite.

Causes of Accidents

An analysis of industrial accidents in 1943 by the National Safety Council revealed that machinery, such as presses, rolls, mixers, and similar hazardous types were involved in the largest proportion of serious accidents—35 per cent—in the chemical industry. The injured employes were usually engaged in oiling, cleaning, adjusting, repairing, and performing other than ordinary duties. Adequate guarding and maintenance, and proper instruction of employes offers the greatest opportunity for reducing such injuries.

Acids, alkalies, and other chemicals were involved in 11 per cent of all injuries. The proportion involving floors, ladders, platforms, vehicles, and pipe lines and other pressure apparatus was almost as large.

The most frequent unsafe practices involving all types of machines, tools, and materials were as follows:

1. Cleaning, adjusting, repairing, and doing similar work near moving parts of machinery.

2. Using defective machinery and tools, or using the wrong type of tool or machine for the work, or using the hands instead of tools, such as reaching into a hopper with the hands instead of using a stick to remove clogged material.

3. Starting, stopping, or otherwise operating equipment without authority, without signaling or getting the proper signal, or without warning, such as starting a machine while a repairman has his hands near moving parts.

4. Standing or working in unsafe positions, such as under suspended loads, straddling from a ladder to a machine, and standing on railings.

5. Failure to wear goggles, safety shoes, and other personal protective equipment.

6. Walking on vehicular right-of-way, entering pits and other dangerous areas.

7. Removing guards and other safety devices.

8. Mixing or combining substances so that explosion, fire, or other hazard is created, such as pouring water into concentrated sulfuric acid.

The principal unsafe conditions were these:

1. Inadequate guarding.

2. Worn, broken, poorly designed, and otherwise defective equipment.

3. Lack of goggles and other personal protective equipment.

4. Inadequate illumination and ventilation.

FOR QUALITY, *Plus* GREATER SAFETY and UTILITY . . .

B & A Reagent Hydrofluoric Acid

IN THE MODERN PLASTIC CONTAINER

B & A HIGH QUALITY!

Reagent HF meets exacting A.C.S. Specifications. . . .

Mol. Wt. 20.01 Assay Min. 48.0%

Maximum Limit of Impurities

Nonvolatile	0.001%
H_2SiF_6	0.10 %
Cl	0.001%
SO_4	0.001%
SO_3	To Pass Test
F	0.0001%
..vy Metals (as Pb)	0.0002%
..sphorus (P)	0.0001%

..hnical grades also available

STYLED FOR SAFETY!

1. Extra strength and durability . . . bottle and closure made entirely of an acid-proof plastic.
2. No clinging drops on lip . . . "Siphon Action" feature draws back fluid at tip when pouring stops.
3. No leakage . . . "Screw Tight" cap seals bottle safely . . . prevents fuming.
4. "Non-Tip" base . . . an added safeguard against spilling.

AND FOR UTILITY!

1. Accurate measure with advanced design pour-out and "Siphon-Action" lip.

2. Complete control . . . bottle fits the hand for easy pouring.

3. Special closure prevents acid contamination . . . protects purity and strength.

4. Transparent—acid level always visible . . . no more guess work!

In January, Baker & Adamson announced to the chemical world the availability of its reagent and technical grade hydrofluoric acid in a revolutionary new transparent plastic container.

The acceptance was immediate; the demand universal because, with this B&A innovation, hydrofluoric acid was packaged for the first time in chemical history in a safe, modern container. With it, the research and industrial chemist saw an opportunity to eliminate forever from his laboratory the clumsy wax bottle for HF that had long been so unsatisfactory.

Study the many advantages of this superior product and container . . . you'll want them for your laboratory too. Why not get the standard carton of 25 one-pound bottles now . . . or put it on your next order of B&A Reagents?

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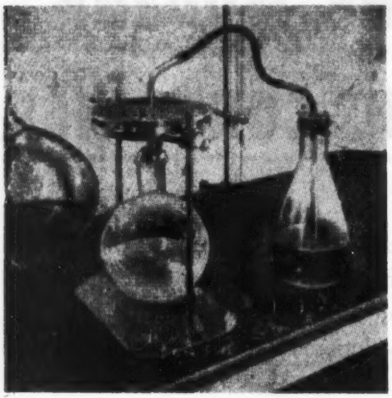
LABORATORY NOTEBOOK

New Pyrogen and Bacterial Laboratory Filter

A new laboratory filter, designed especially for small production operations, has been developed by Ertel Engineering Corp., Kingston, New York.



It features a mechanical design which permits double filtration in series. One of the integral parts of the new unit is the built-in stone fibre eliminator through which all the filtrate must pass. The unit is constructed in bronze plated materials or entirely from stainless steel. The sizes that are now available are 4 in. and 8 in. diameter. For example, the 8 in. capacity unit will filter 1 liter of aqueous solution in 15 minutes at 10 pounds pressure. This has been found to be adequate for most large run tests in laboratories throughout the country. Counter pressure is employed to force the liquid from the pressure flask to the filter. A minimum of parts make the unit easy to clean and simple to assemble. The assembled size of the unit permits sterilization in standard size autoclaves.

Arc-Spark Stand

A universal Arc-Spark Stand for use in spectography has been announced by the Harry W. Dietert Co. It is truly universal in that it combines all of the desirable features of the conventional stand used in general arc work, of the jig-loaded stand used for metal-rod analysis, and of the Petrey stand used for metal-plate analysis.

The unit is completely enclosed—the door is furnished with a safety switch to obviate the hazard of shock, and with a dark red transparent plastic panel which allows good discharge visibility and at the same time provides complete safety for the eyes. The stand is ruggedly constructed from large aluminum castings. Massive steel electrode holders are water-cooled, while specially insulated tubing on the water system prevents power leakage or breakdown even when used with the high-voltage spark unit. A unique friction drive for positioning the electrodes insures exceedingly smooth operation and accuracy of adjustment. It provides a 1″ continuous travel on both the upper and lower holders, a minimum spacing of ⅝″ between holders and a maximum of 2⅝″. Calibrated stops limit each electrode holder's motion at top and bottom. These are adjustable to .002″ with a vernier knob thus allowing exact duplication of a wide variety of settings.

For use as a jig-loaded stand, the holders are locked in place and an accompanying jig is used for spacing the sample rods rapidly and accurately. Another jig, also furnished, may be used for spacing rod-carbon electrodes for arc work.

The instrument is easily convertible for use with flat specimens by raising the upper electrode out of the way or completely removing it and putting into place a rotary table which is pinned for exact positioning.

A positive sample holder is a special feature of this stand. This exerts spring tension against the top of the flat specimen, thereby insuring perfect electrical contact at all times, irrespective of the condition of the sparking surface.

The unit includes high tension cables eight feet long, with high current capacity and excellent insulation. These are fastened permanently to it. The insulation in the stand itself is more than adequate, due to the use of specially formed ceramic insulators.

Buffer Solution Preservative

Buffer solutions have been protected from mold contamination by the addition of toluene. This is not entirely satisfactory, as it creates a two-phase solution, which evaporates and gives off toxic fumes; and it necessitates the use of a pipette. A recently devised expedient is to add a small quantity of a quaternary ammonium salt. These materials are esentially neutral and effectively fungicidal in low concentration.

Boil Gently

Granules of inert material that replace marble chips or glass beads, have been given the name Boileezers. When added to low boiling liquids such as alcohols or acetone these particles minimize the danger of boiling over.

Determining Metal Concentration in Plating Solution

Solutions of bright alloy plate, used to protect electrical instruments from corrosion and abrasion, are tested by the following method at the Meter Division of Westinghouse Electric Manufacturing Corporation. A precisely weighed piece of platinum is immersed in a sample of the solution, and whirled by an electric motor. Current flowing through the liquid to the platinum deposits on it a plating of the new alloy. The platinum is then re-weighed on a delicate balance. The amount of bright alloy plate which has accumulated may be translated into ounces of plating metal per gallon of solution in the main plating tank.

Plating solution is deposited on platinum

INDUSTRY'S BOOKSHELF

Amino Acids Discussed

OUTLINE OF THE AMINO ACIDS AND PROTEINS, Edited by *Melville Sahyun.* Reinhold Publishing Co., 1944; 244 pp., $4.00. Reviewed by L. J. Teply.

IN VIEW OF THE continually increasing interest in amino acids and proteins, this book is especially welcome at this time. It is essentially a collection of authoritative reviews of most of the important aspects of the subject, and while it does not cover the whole field and is not an exhaustive treatise on any one phase, there are abundant references for those desiring more detailed information. Considerable emphasis is placed on the discovery, isolation and chemical methods for the determination of amino acids, with somewhat less stress on the nutritional side. Deep involvement in theoretical and controversial subjects such as the chemical structure of proteins is avoided. Although one might wish to have more details on such topics as the microbiological determination of the amino acids, on reflection, one realizes that this development has been so recent as to make more than brief mention impossible. The entire volume is written in a simple, readable style and should dovetail perfectly with any library of more detailed and specialized texts.

Elementary Physical Chemistry

FUNDAMENTAL PRINCIPLES OF PHYSICAL CHEMISTRY, by *Carl F. Prutton* and *Samuel H. Maron.* The Macmillan Co., New York, 1944; 780 pp. Illustrated. $4.50. Reviewed by R. L. Spaulding, Hercules Powder Co.

IN WRITING this text on elementary physical chemistry, Professors Prutton and Maron of the Case School of Applied Science have made available to teachers and students, a book covering the fundamental principles of the subject in a thorough, sound, up-to-date, and clear manner. Claiming no radical innovations in their presentation of the subject, they have nevertheless made some welcome changes in the organization of material and the emphasis placed on some of the more or less neglected phases of physical chemistry.

Thermodynamics is introduced very early and is used as a foundation for the development of the science, providing unusual clarity and rigidity of treatment. Throughout the book there is ample evidence of an effort to systematize and organize the material in such a manner that the relationships of the various topics are logical and easily understood. At the same time, the authors have shown commendable frankness in discussing the topics in a scientific, rather than dogmatic fashion, and are usually careful to point out the limitations of a particular equation and those cases where it is not valid. As a further aid to a thorough understanding of the subject, considerable attention has been devoted to the experimental side of physical chemistry, with many diagrams of apparatus, discussions of experimental techniques (difficulties encountered) and extended lists of practical exercises and problems. Considerable emphasis has been placed on the treatment of chemical equilibrium which is presented from both the kinetic and thermodynamic point of view, and the treatment of electrochemistry is exceptionally thorough for a text of this type. The phase rule, so frequently neglected in an elementary course, is also emphasized, especially the practical construction and use of the various types of phase diagrams.

Designed primarily for a full year of work, this book could easily be used for shorter courses by suitable selection of material. Students and teachers alike will welcome it for its logical development of fundamental concepts and clear presentation.

Engineering Text

MATERIALS AND PROCESSES, edited by *J. F. Young.* J. Wiley and Sons, Inc., N. Y., 1944; 628 pp., $5.00. Reviewed by *Dr. R. S. Egly,* research engineer, Commercial Solvents Corporation.

THIS BOOK is one of the General Electric Series. Editor Young has assembled his material from lectures given in a general course in materials and processes in the General Electric Advanced Engineering Program. Many engineers cooperated in preparing these lectures. In so far as practicable, credit has been given at the head of each chapter to those whose lectures and work are incorporated therein. Each section benefits from preparation by experts, but the material has been so well organized by its editor, that the work has a unity seldom achieved in such books.

The first half of the book is devoted to materials of construction. Engineers in other fields may object to the emphasis given to properties of materials used in manufacturing electro-mechanical products. For example, 68 pages are devoted to magnetic and electrical properties of materials compared to 26 devoted to corrosion. However, there is a wealth of information of general interest. The chapters on alloys, mechanical properties of metals and heat treatment are especially good. The second half of the book deals with the fabrication of material, casting, forging, welding, machining and other manufacturing processes.

This book should have wide appeal as a textbook. It should also be of value as a reference book, especially to young engineers with limited experience in design work. The excellent sections on plastics, powder metallurgy, metalizing, resistance welding, and other newer techniques should attract the older engineers interested in keeping up-to-date on recent developments.

Throughout the book emphasis is laid on giving the designer the background needed to select proper materials and to design for easy processing, or to consult intelligently with metallurgists and production men concerning his problems.

The presentation is enhanced by a profusion of excellent photographs and drawings, and by selected lists of review questions following each chapter.

Inorganic Work Reprinted

EPHRAIM'S INORGANIC CHEMISTRY—First American photo-reprint edition of the Fourth revised English edition, by *P. C. L. Thorne and E. R. Roberts.* Nordeman Publishing Co., Inc., New York 3, N. Y., 1944; 921 pp., $8.75. Reviewed by *Roy E. Heath,* Wyandotte Chemicals Corporation.

THE PURPOSE and scope of this work has best been stated by its authors, "In this edition the general scheme, which proved such an attractive feature of earlier editions, has been maintained. It may perhaps be pointed out to the new reader that this work is designed to include a great deal of information as concisely as possible and yet to present it in a palatable form. The materials of inorganic chemistry are dealt with collectively rather than individually, with a consequent saving of space and of fatigue to the reader." An admirable job has been done in accomplishing their goal.

The fourth revision (August, 1943) maintains the high standards established by previous editions. Addition of significant developments through 1940 and four references to 1941 publications have made considerable changes in certain portions of the text. The chapter on Radioactive Elements and Isotopes has been revised and will satisfy the requirements of all but specialists in this field.

Although not designed as a reference work, one familiar with the book finds it valuable for this purpose. Recent developments in applied inorganic technology are not within the scope of this book.

It is interesting to note that most persons making serious claims to being inorganic chemists have a copy in their library.

BOOKLETS & CATALOGS

Chemicals

A753. Anhydrous Ammonia, with information about handling, piping, containers and technical service, is presented in a 14-page booklet from The Barrett Division, Allied Chemical & Dye Corporation.

A754. Colloidal Graphite. A new folder (No. 440) describes and catalogs a number of dispersions of dag colloidal graphite, in various fluids, which have been developed during the war. Acheson Colloids Corporation.

A755. Corrosion is the subject of a 54-page booklet, which deals with processes controlling factors and testing. Also included are a work sheet and data on the characteristics of Monel, nickel and Inconel. International Nickel Company, Inc.

A756. Cotton Linters. An artistically arranged, 26-page booklet, done on heavy paper with many illustrations tells many uses for linters and cotton by-products in such fields as paper, plastics, lacquers and packaging. Railway Supply & Manufacturing Co., Rayco Linter Division.

A757. Eighty-fifth Anniversary of the petroleum industry is noted in a brochure which gives the history and pictures of the pioneers. American Petroleum Institute.

A758. Fluorochemistry is the title of a new bulletin of value to those interested in fluorescent analysis of chemicals, liquids and solids. It presents the basic concept of luminescence and provides information fundamental to the new applications of fluorochemistry. Ultra-Violet Products, Inc.

A759. Heat Treating with Ammonia is the subject of a booklet presenting information to aid in the safe handling of anhydrous ammonia. The Pennsylvania Salt Manufacturing Company.

A760. New Industrial Chemicals are classified and presented with descriptive material under three headings: organic products, fungicides (the pyridylmercuric salts), and ultra-pure chemicals for phosphors, in a 16-page informative booklet from Mallinckrodt Chemical Works.

A761. Oils for the Protective Coating Industry, is the title of a new concisely organized catalog, which wears a stiff yellow cover and is bound by a spiral. Spencer Kellogg and Sons, Inc.

A762. Organic Chemicals Price List, comprising 180 pages, bound with spiral rings, has been published by Eastman Kodak Company.

Equipment—Methods

F278. Automatic Valves and Pressure Controls, for use with water, air, steam and oil are described in a new 28-page catalog. A. W. Cash Valve Manufacturing Company.

F279. Brazing Carbide Tool Tips with Easy-Flo No. 3 (silver brazing alloy) is explained in bulletin 11-A from Handy & Harman.

F280. Centrifugal Separators which (1) separate solids from slurries and pulps, (2) classify by type of solid and (3) classify solids by size are shown in detail in bulletin 501 from Merco Centrifugal Company.

F281. Coke Ovens. A new catalog, which is fully illustrated with cross sections, flow diagrams and pictures of recently developed mechanical features, has been put out by Wilputte Coke Oven Corporation.

F282. Diffraction by X-Ray is explained with diagrams, typical diffraction films and tabulations, in a new 12-page booklet. North American Philips Company.

F283. Dry Pulverized - Material Cooler, designed for Portland cement and other products is extensively pictured in an 8-page bulletin from the Fuller Company.

F284. Equipment, including piping, pressure vessels, heat exchangers, and heaters are listed with diagrams and tables in a 15-page booklet. American Locomotive Company.

F285. Face Shields. Of primary importance to those interested in safety, is a 4-page catalog showing several models of face shields with cellulose acetate windows. Boyer-Campbell Company.

F286. Facts About Rotary Pumps are colorfully enumerated in a 5-page brochure with photographs. Blackmer Pump Company.

F287. Insulating Fire Brick, of five different varieties, for temperatures up to 26000 degrees F., are presented in an 8-page booklet. Armstrong Cork Company.

F288. Leather Belting Manual. This 56-page illustrated manual is printed on heavy paper and presents well-organized material on tannages, belt dimensions, several types of drives and power transmission. Graton & Knight Company.

F289. Material-level Indicator is fully diagrammed in a 4-page leaflet from Fuller Company.

F290. Multiple V-Belt. Nineteen reasons for the importance of this mechanism are presented in a 14-page booklet from the Multiple V-Belt Drive Association.

F291. Temperature Control Systems for electrically-heated furnaces, ovens, baths and other units, are comprehensively described, with a generous fund of data in a recent 25-page booklet. Leeds & Northrup.

F292. Thermostat. Bulletin 441T describes Type K thermostat, which may be used to control electric devices between temperatures of minus 120° and 600° F. United Electric Controls Company.

F293. Vertical Hydraulic Bushing Presses for railroad shops, are shown with specifications in a 4-page folder from Watson-Stillman Company.

F294. Water Deaeration to prevent corrosion of pipe lines, heat exchange, and other equipment is outlined in reprint 36 from the Cochrane Corporation.

F295. Water Studies. A collection of articles on the control of corrosion, scale and algae with discussions of steam and proportioning problems is printed in a 52-page booklet from D. W. Haering & Co., Inc.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

Chemical Industries, 522 Fifth Ave., New York 18, N. Y. (3-5)
I would like to receive the following free booklets or catalogs.

A753	A757	A761	F280	F284	F288	F292
A754	A758	A762	F281	F285	F289	F293
A755	A759	F278	F282	F286	F290	F294
A756	A760	F279	F283	F287	F291	F295

Name .... **(Position)** ....

Company ....

Street ....

City & State ....

HAVE YOU SEEN our new advertising campaign in leading magazines? Here's our latest page, telling about the different packaging and plastic products now made by us. It also describes our new and expanded facilities—all designed to give you even better service. Watch for these full-color ads in such leading national magazines as *Time*, *Newsweek*, *U. S. News*, *Business Week* and *Fortune*. And keep your eye on Continental and on the Continental trademark, too. The Triple-C stands for one company with one policy—to give you only the very best in quality and service.

NEWS OF THE MONTH

New Procedure for Allocation Extensions

Simplified procedure to obtain extension of authorization for use of allocated chemicals has been announced by the Chemicals Bureau, War Production Board.

A single letter may be written to the War Production Board, Chemicals Bureau, Allocation Office, Washington 25, D. C., listing all allocated chemicals and allied products for which an extension of authorization for use is requested beyond the limit set by Order M-300, Paragraph (v) or by any other Chemicals-Bureau order.

In this letter, the applicant should list each material, the applicable M-300 schedule or other order, each use for which authorization has expired, the unused quantity previously authorized for that use, the original allocation period, the date the material was ordered from the supplier, the requested shipping date, the date of arrival, and the requested time extension. If a number of materials are to be used together this fact should be mentioned in the letter.

Shipping difficulties have in some cases caused allocated materials to arrive after the allocation period, WPB pointed out. West Coast manufacturers in particular have been handicapped by late shipment. Difficulties are complicated by the fact that late arrival of one allocated chemical may delay use of other allocated chemicals required for the same purpose. Under Order M-300, Paragraph (v), allocated materials that have not been used by the end of the month following the allocation period revert to inventory and cannot be used without further WPB authorization.

The announced simplified procedure permits a single letter to be filed requesting extension of time for use in the case of several different materials instead of having the applicant file forms and letters under each different governing M-300 schedule or other order.

This simplified procedure applies only when requesting extension of previous authorizations for use and may not be followed when filing any other kinds of applications relating to allocated chemicals and allied products.

Midwest Institute Launches Program

The newly formed Midwest Research Institute, Kansas City, Mo., will launch into full-scale production following a meeting of trustees February 5, at which time the extensive research program to be carried on will be announced.

The Institute's laboratories, already employed in the study of a number of projects, are being equipped and expanded to cover all research activities.

Harold Vagtborg, nationally known scientist and former director of the Armour Research Foundation, Chicago, arrived in Kansas City January 2 to assume his duties as president of the Institute.

Members of the Institute's staff thus far appointed include: Dr. George E. Zeigler, formerly scientific advisor to Armour, who will direct the Institute's relationships with educational institutions; Dr. George W. Ward, a geologist and minerologist, former supervisor of Armour's ceramic industrial materials research, and fellow at the national Bureau of Standards, Washington; Dr. C. L. Shrewsbury, formerly of the departments of agricultural chemistry and animal husbandry of the Agricultural Experiment Station, Purdue University; Dr. Elza O. Holmes, formerly of the Military Chemical Works, Pittsburg, Kansas; Dr. Frank M. Trimble, formerly co-chairman of the physics research department at Armour; Dr. F. E. Horan, of Columbia University, a specialist in starch research; M. N. Schuler, with a bachelor's degree in biology and chemistry from the University of Kansas City; Miss Jane Hathaway, with a bachelor's degree in chemistry from Bradley Polytechnic Institute, Peoria, Ill., and Miss Margaret Gill, with a bachelor's degree in chemistry from Vanderbilt University, Nashville, Tenn.

Activities of the Institute will cover chemistry, physics, metallurgy, minerology, biology, bacteriology, chemical, civil, electrical and mechanical engineering and other fields of science and science application.

Du Pont Offers 35 Research Fellowships

Thirty-five postgraduate fellowships at 29 universities are offered by E. I. du Pont de Nemours & Co. for the academic year of 1945-46, it was announced recently.

This is an increase of 13 over previous years and for the first time includes two fellowships in physics, reflecting the increasing need for physicists in the chemical industry. Five of the fellowships are in chemical engineering and 28 in chemistry.

Two changes have been made in the fellowship plan this year. First, in order to equalize the value of fellowships among the various universities, where tuition rates differ, the company is paying the tuition in addition to the stipend. And second, the amount of the stipend has been increased from $750 to $1000. Women as well as men are eligible, and selection of the recipients and the subjects of their researches is left to the universities. Holders of these fellowships are not restricted in any way in their choice of position when the fellowship expires.

This plan was adopted by the company to encourage and assist graduate students at a time of acute shortage of trained research people. It was felt that this was one way in which it was possible to help universities in the task which all of them face in rehabilitating and rebuilding their graduate schools. The Du Pont fellowships were established in 1918.

It is expected that a number of veterans, returning to school after discharge from the armed services, will be eligible for the fellowships this year.

Eight universities were added to the fellowship list this year and the subjects in which the fellowships are offered follow: Brooklyn Polytechnic Institute, chemistry; Carnegie Institute of Technology, chemical engineering; University of Indiana, chemistry; University of Iowa, chemistry; University of Nebraska, chemistry; University of Notre Dame, chemistry; University of Rochester, chemistry; and University of Texas, chemistry.

The other universities and the fellowships to be granted at each are as follows: Columbia University, one each in chemistry and chemical engineering; Massachusetts Institute of Technology, one each in chemistry, chemical engineering and physics; University of Chicago, one each in chemistry and physics; University of Michigan, one each in chemistry and chemical engineering; University of Wisconsin, one each in chemistry and chemical engineering.

One fellowship in chemistry is being offered at each of the following: California Institute of Technology, Cornell University, Harvard University, Johns Hopkins University, Northwestern University, Ohio State University, Pennsylvania State College, Princeton University, Purdue University, Stanford University, University of California, University of Illinois, University of Minnesota, University of Pennsylvania, University of Virginia, and Yale University.

Economics of Waste

The annual peacetime loss to the chemical industry resulting from its waste materials is $35 million worth of smell,

dust, nuisance, and pollution, according to figures given by John Shaw, safety director of Hercules Powder Company and chairman of the National Safety Council's Waste Disposal Committeee.

The Committee has adopted a four-fold approach to the amelioration of this problem: improvement of process yields to reduced wastes; sale of wastes (if salable); encouragement of processing wastes to make salable products; and, as a last resort, safe and unobjectionable disposal methods.

Release DDT

A limited quantity of DDT, the war-developed insect killer, has been released to DDT producers for distribution for agricultural and other civilian experimentation, according to the War Production Board.

Formerly, requests for DDT for research work required application to WPB for individual allocations of the chemical. Released according to the provisions of Paragraph (f) of Order M-300, the general chemicals allocations order, the material can now be obtained directly from DDT producers without further permission from WPB.

Although direct military uses have required the entire supply of DDT, a limited quantity will be made available for research directed toward development of commercial uses for the chemical.

In releasing the material for experimentation, WPB's Office of Civilian Requirements and the War Food Administration instructed that DDT producers, in distributing the chemical, give consideration to work carried out under the supervision of experienced investigators, aimed at determining the suitability of the chemical for agricultural and other civilian uses.

Chemical Factory Workers Earn Less

Weekly earnings of factory workers in chemical and related fields showed a decrease of 5 percent with an average of $43.70. This compared with an average of $37.94 for all nondurable goods manufacturing.

November - October comparisons in chemical and related lines were reported as follows:—

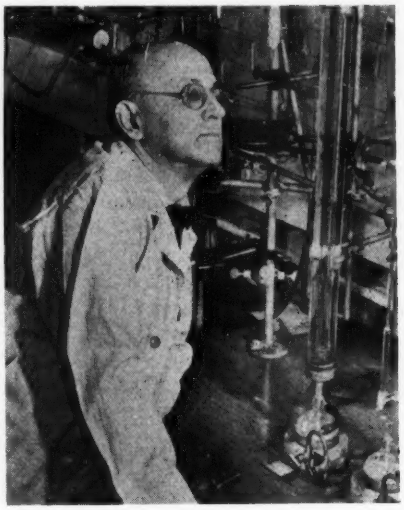
Average Earnings

	Weekly Nov. 1944	Oct. 1944	Sept. 1944
Chemical and allied products	$43.70	$43.94	$44.08
Ammunition	45.29	46.05	45.08
Chemicals	52.48	51.99	52.22
Cottonseed oil	28.89	28.79	27.57
Crude petroleum, production	53.81	52.92	55.04
Drugs, medicines, insecticides	35.35	35.30	35.15
Explosives, safety fuses	46.02	46.71	47.41
Fertilizers	30.83	31.59	32.52
Paints and varnishes	46.23	46.48	46.06
Petroleum refining	58.92	60.32	58.24
Rayon, allied products	39.14	39.11	39.22
Soaps	48.12	48.89	49.26

Metalloy Manufactures Lithium Salts

Increased facilities for large scale production of a comprehensive line of lithium salts have been added to the plant of Metalloy Corporation at Minneapolis, Minnesota. Since its inception in 1942, the plant has been devoted almost entirely to production of lithium chloride. New units will enable tonnage production of lithium carbonate, fluoride and hydroxide, both monohydrate and anhydrous, all of which are now available to industry.

Kyrides Gets First ACS Midwest Award



Dr. Lucas P. Kyrides, research director of the Organic Chemicals Division of Monsanto Chemical Co., has been designated as winner of the first Midwest Award of the American Chemical Society.

WPB Curtails Carbon Black

Steps to curtail carbon black consumption to the extent of 10,000,000 pounds per month were announced recently by James F. Clark, director of the War Production Board's Rubber Bureau.

"The splendid step-up in production to help meet the increased tire requirements of the armed forces has brought us face to face with an immediate, critical shortage of carbon black," Mr. Clark said. "New facilities to produce additional carbon black are now being planned and expedited by WPB's Chemicals Bureau, but these new facilities are a future answer rather than a help to the shortage which is with us today.

The conservation program for carbon black was reflected in an amendment to the WPB Rubber regulations (List 35 Appendix II to Rubber Order R-1). The director of the Rubber Bureau explained that not only has a limitation been placed on the total permitted amount of carbon black for each rubber product but also a special limitation has been imposed concerning the percentage of permitted "channel type" carbon black for each product. The limitations went into effect February 15.

Through the reductions prescribed in List 35 of the rubber order, approximately 7,500,000 pounds of carbon black will be conserved per month, Mr. Clark estimated. Future additions to List 35 are under study, to provide the additional monthly saving of 2,500,000 pounds, which must be achieved immediately, he said.

"The carbon black conservation program has been carefully studied by the technical consulting committees of the Rubber Bureau," Mr. Clark explained.

U. S. C. C. Acts for Importers

The United States Commercial Co. will accept requests from importers for essential oils and floral products from France, pending restoration of private trade, the Foreign Economic Administration has stated. No essential oils have been received from France since the United States entered the war.

The USCC has worked out this arrangement at the request of the essential oils industry, which cannot send its own representatives to France at the present time. Gerald Strauss, USCC representative in France, will act for importers desiring such assistance, by contacting French suppliers named by importers and by expediting shipments.

Importers may obtain the form of the purchase agreement by writing to C. J. Horney, General Commodities Division, U. S. Commercial Co., Temporary T Building, Washington 25, D. C. The agreement, when completed, lists the importer's requirements and serves as a contract for the purchase of items specified by the importer.

Monsanto Opens New CWS Plant

Monsanto Chemical Company has started full scale production at the Duck River Plant, C.W.S., a new government-owned plant which Monsanto operates for Chemical Warfare Service at Monsanto, Tenn.

Costing more than $2,500,000, the new plant adjoins and utilizes by-products of Monsanto's elemental phosphorus plant.

The new plant was designed by Charles T. Main and Company of Boston, Mass., at the request of the War Department, and was built by the Kershaw Construction Company of Birmingham. In it are manufactured vital war chemicals.

Between 100 and 150 persons are being employed, with key personnel being assigned from Monsanto's various phosphate division plants. A. T. Beauregard, plant manager of the elemental phosphorus works, is in general charge, and John C. Garrels, Jr., is superintendent.

 Prepared Monthly by U. S. Industrial Chemicals, Inc.

U.S.I. CHEMICAL NEWS

March ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1945

Alcohol-Water Injection Proves Key to Huge Power Increase in Gasoline Engines

Present Large-Scale Use on War Planes Seen Extending to Cars, Buses and Trucks

During 1944, the curtain of censorship was lifted just far enough to give motor-minded America an enticing preview of a wartime development that will go far to step up the performance and operating economy of postwar passenger cars and commercial vehicles. The development was the injection of a mixture of alcohol and water into the gas-air stream of the engine.

Extra Horsepower

The first story broke in May of last year. Dramatically it told how a famous Navy fighter pilot owed his life to the new development. A sudden burst of extra speed, released at the flick of a switch, had enabled him to streak out of range of three pursuing Zeros. Later stories revealed how alcohol-water injection was supplying extra power for take-offs and steep climbs.

The limiting factor, of course, is the amount of the alcohol-water mixture that is carried on a plane. At present, only enough is carried to give the plane a few minutes flying at the higher speed. But those are the critical minutes that can mean the difference between getting the jump on Jerry—and disaster.

The Theory

Every motorist has experienced the "lift" a gasoline engine gets on a damp day or after dark when humidity is high. The explanation, as automotive engineers know, is to be found mainly in the internal cooling action of the water. This cooling action tends to smooth out the progress of the flame front during combustion, applying more uniform pressure on the piston head throughout the stroke. Self-ignition of the compressed hot gas is prevented so that detonation does not occur.

(Continued on next page)

Official U. S. Navy Photo

A Helldiver earns its name! On many combat planes, alcohol-water injection provides priceless minutes of super speed.

Non-Permit Alcohol Developed by U.S.I. for Aircraft Use

Vitol Special Widely Used for Test Purposes and Deliveries

One of the problems facing the aircraft industry right at the outset of the alcohol-water injection program was to find a suitable alcohol for test, experimental, and delivery purposes. The Armed Forces themselves, of course, could use any alcohol they chose without securing a permit. To private aircraft companies, however, any specially denatured alcohol would have entailed securing alcohol permits and the inescapable red tape and inconvenience associated with the use of specially denatured alcohol.

The aircraft industry needed a proprietary product that met Army and Navy specifications on the one hand, and was approved by the Treasury Department for use without permit on the other.

Vitol and Vitol Special

As a result of its early work on alcohol-water injection in conjunction with the Vita-Meter Corporation, U.S.I. had developed a proprietary formula which solved the immediate problem. The formula had been approved by the Alcohol Tax Unit of the Treasury for use without permit and the product was ideally suited for use in the operation of aircraft engines. Early last year, "Vitol" made its entry into the aviation field and was used extensively in testing combat aircraft.

The Army and Navy specifications, however, called for a different denatured alcohol

(Continued on next page)

Lube Oil Additives Made by New Process

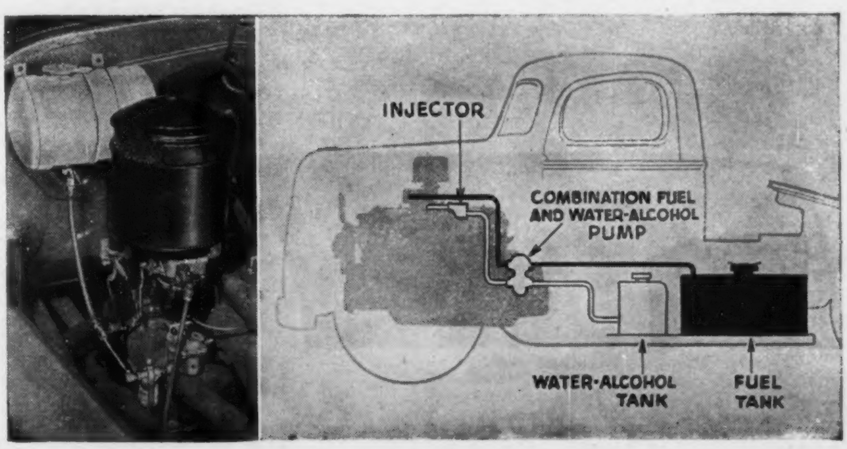
For years, high-pressure lubricants such as those used as cutting oils and for heavy-duty truck transmissions, have been prepared by adding small amounts of sulfurized oils to regular lubricants.

A recently granted patent covers an improved method of preparing such sulfurized mono-esters of fatty acids for use as lubricant improvers. A feature of the new process is that glycerine is reclaimed.

Fatty glycerides, prepared by mixing lard oil and cottonseed oil, were heated to approximately 330 deg. F., and a small amount of sulfur added. The sulfurized glycerides thus obtained were then reacted with a mixture of butanol and sulfuric acid. When the reaction was completed, the mixture stratified into an ester layer above and a glycerine-acid layer below. The ester layer was neutralized with lime. After further refining with activated clay, the treated oil was filter-pressed out.

The glycerine-acid layer was further refined to recover the glycerine.

(Below left) Typical passenger car installation. (Right) Schematic diagram of alcohol-water injector installation on truck. Although a small additional fuel tank is required, the increase in power and engine life far outweigh the disadvantage.



March ★ **U.S.I. CHEMICAL NEWS** ★ 1945

Alcohol-Water Injection

(Continued from preceding page)

Water has a high latent heat of vaporization (970 Btu per lb) so that if internal cooling were the only factor, there would be no point in using alcohol (367 Btu per lb). However, extensive tests have shown that alcohol alone and alcohol-water mixtures give better results than water alone; and water will freeze at low temperatures. When alcohol is used, peak pressure is delayed until the piston is further down its stroke and a more efficient cycle is obtained. Important, too, less engine roughness is encountered at high-power output; life of bearings and other engine parts is prolonged.

Postwar Possibilities

A vast amount of research has been done on alcohol-water injection into the gas-air stream of aircraft engines which, while details cannot now be revealed, points to its increasing use in this field. Its wide use on supercharged aircraft engines already has given remarkable results.

In January of this year, three engineers of Thompson Products, Inc. delivered a paper before the S.A.E. describing their extensive tests on alcohol, alcohol-water and water injection in truck and passenger car engines. Their conclusions, while pointing out the need for greater research, are highly significant. They may be summarized as follows:—

1. The control of pressure rise and shock with alcohol-water injection may facilitate the design of higher-compression engines of minimum weight.

2. That it will be particularly effective if supercharging is used on ground vehicles. Here, it would enable the engine to consume more air at the same engine speed.

3. That it may have a great field of use in light aircraft, designed to operate on ground-vehicle fuels.

4. That it will tend to maintain cleaner engines with softer, more easily removed carbon deposits.

5. That best gains through its use are realized when fuel about 12 octane numbers below engine requirements is used.

6. That it will effect economics, by permitting the use of lower-grade fuel, which will extend its use to many operations.

Acetone Aids Recovery of Biotin from Waste

Biotin, an important part of the B-complex vitamin, can be recovered from waste fermentation liquors, according to claims made in a newly granted patent assigned to a leading laboratory.

Mother liquors from fumaric acid fermentation processes are treated with sufficient activated charcoal to absorb the biotin. Biotin is then extracted from the charcoal. Among the extracting agents suggested is an aqueous solution of 60 per cent acetone and 2½ per cent ammonia.

Non-Permit Alcohol

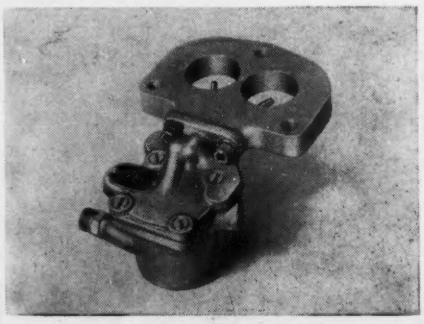
(Continued from preceding page)

—S.D. No. 3-A. To help aircraft builders avoid the necessity for securing a permit to use S.D. No. 3-A, U.S.I. altered its original formula and produced Vitol Special.

Vitol Special is essentially the same as the product called for by Army and Navy specifications and performs equally well. But it has a strong, non-alcoholic odor added which warns against its misuse. Being a proprietary product, it requires no permit and the markings on the drums show no reference to alcohol.

Penicillin vs. Heart Disease

Sub-acute bacterial endocarditis, a heart disease from which recovery was rare, is responding to penicillin, according to reports from two New York hospitals. The "cure" is effective only where the organism is a streptococcus sensitive to the drug.



Present type alcohol-water injector mounted on Flange, set between carburetor and manifold.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Light-fast acetate dyes, including reds, greens, blues, oranges, browns, yellows and violets, are offered for use on both cellulose acetate rayon and nylon. Color fastness varies with the depth of the color. **(No. 911)**

USI

First-aid burn treatment is offered in a new ointment which is designed to stop pain, exclude oxygen, prevent infection and stimulate healing. **(No. 912)**

USI

A new anti-stick agent is claimed to facilitate removal of molded plastics from the mold. The liquid, packaged in pint bottles, is said to saturate the mold, making it free ejecting for a large number of parts before another application is needed. **(No. 913)**

USI

Freeze-and-thaw resistant concrete is claimed to result from the use of a new-type portland cement. An added air-entraining material is said to give this new quality, plus cohesion and uniformity. **(No. 914)**

USI

A substitute for camphor, in nitrocellulose, is one of the uses suggested for a new chemical described as having the properties of both a high boiling solvent and a volatile plasticizer. It remains fluid down to —70 deg. C. **(No. 915)**

USI

To overcome odors, no matter how noxious, a chlorophyll air freshener is offered for industrial and commercial application. Designed to be used in connection with air conditioning or ventilating systems, it may also be used in non-conditioned spaces. **(No. 916)**

USI

A stable organic peroxide is claimed by its manufacturer to be insensitive to shock, to form clear, bubble-free films, and to be useful as a catalyst in bulk polymerization. It is soluble in all common organic solvents. **(No. 917)**

USI

New flame-resistant gasketing is offered in 1/8 in. and 1/16 in. thicknesses, with the added claim that it is suited for joint seals in ventilating systems and water, fuel-oil and diesel-oil systems. Other suggested uses include gasketing for airlock and refrigerator doors. Pressures up to 25 p.s.i. can be maintained. **(No. 918)**

USI

A fluorescent plastic dye, in solution form, is stated to impart fluorescence to any type of plastic. Suggested uses include decoration, dials, medical equipment, etc. **(No. 919)**

USI

Plywood panels 50 feet long, and up to 8 feet in width and 1¼ inches in thickness, are on the market. Laminations are bonded with phenolic-resin adhesives. **(No. 920)**

INDUSTRY ADVISORY COMMITTEES

Zinc Chromate Production Peak Reached

Methods of increasing zinc chromate production were discussed at a recent meeting of the Chemicals and Organic Pigments Industry Advisory Committee and it was the consensus that the limit of production had been reached with the current available manpower, according to the War Production Board. Members said that if more labor and chrome chemicals could be secured more zinc chromate could be manufactured with the facilities now available.

The current shortages of chrome chemicals and lead were discussed and it was pointed out that the new lead chemical Order M-384 (Lead Chemicals) is not going to limit the production of chrome pigments, which are still controlled by Order M-370 (Chrome Pigments).

The organic colors covered by Order F-103 (Dye Stuffs and Organic Pigments) were discussed and it was pointed out that the military demand for phthalic anhydride, benzol and toluol were so great that it was questionable that sufficient intermediates would be made available to satisfy quotas now permitted by that order. It was suggested that if these conditions persisted it would be necessary to reduce the quota.

Penicillin Picture Eases

As the supply of penicillin improves, it may be possible to ease controls on the civilian distribution of the drug, representatives of the Chemicals Bureau of the War Production Board told the Penicillin Producers Industry Advisory Committee at a recent meeting.

A 20 per cent increase in monthly quotas of penicillin for more than 2,700 depot hospitals has been in effect since February 1, WPB said. Allocations for January 1945 totaled 35,200,000,000 units (352,000 vials) as compared with 12,200,000,000 units allocated in May, 1944.

Production in December, 1944, was 278,000,000,000 units (2,780,000 vials), while the January 1945 production was approximately 330,000,000,000 units (3,300,000 vials), as compared with an output of 12,500,000,000 units in January, 1944.

Military requirements for penicillin will tend to decrease in a few months as stocks are built up, military representatives reported.

Shipments of penicillin by the Foreign Economic Administration for distribution to allies and friendly neutrals totaled 1,000,000,000 units for June, 1944, and has been substantially increased since that date. These shipments have been made only to those areas in which penicillin control committees have been established, and detailed monthly reports are required from each committee.

Committees Study Insecticide Supplies

Supplies of insecticides for agricultural use in 1945 were discussed at recent industry advisory committee meetings of the arsenical insecticides, pyrethrum and DDT industries, the War Production Board has reported.

WPB emphasized that farmers should order sufficient calcium arsenate to provide for possible emergency use against insect infestations, primarily in the cotton states.

Even though lead supplies have recently become more critical, the Chemicals Bureau of WPB has provided from its lead allotment enough for the lead arsenate requirements of the War Food Administration and the Foreign Economic Administration, WPB said.

Members of the Arsenical Insecticides Industry Advisory Committee pointed out that in the majority of cases where orders for lead arsenates have already been placed, shipping instructions from consumers and dealers have not been submitted along with the orders. Because possible future delays in transportation and potential manpower difficulties may seriously affect the time of delivery, the committee unanimously recommended that consumers and dealers anticipate requirements and place specific orders, including shipping instructions, with insecticide producers at the earliest possible date.

WPB emphasized to the committee that DDT will be released exclusively for experimental and research purposes, and that placement of orders for other insecticides should not be based on the supposition that DDT will be available for commercial use in 1945. It is expected that sufficient arsenicals will be available to meet all 1945 requirements of domestic agriculture, the committee was told.

With the exception of limited quantities of pyrethrum that do not meet military specifications, the entire output of the insecticide will be channeled to the military for use in the production of aerosol bombs, the Pyrethrum Producers Industry Advisory Committee was informed by WPB.

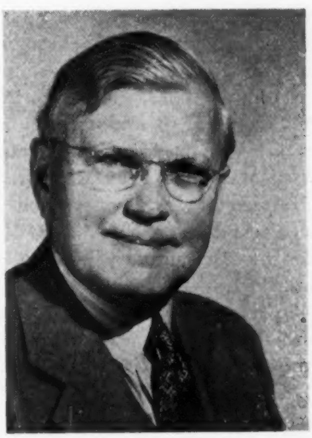
In view of recently increased requirements for DDT, none will be available for other than military use, with the exception of limited quantities to be made available for experimental and research work, WPB told the DDT Producers Industry Advisory Committee.

Need Increases for Phthalic Alkyd Resins

Military requirements for phthalic alkyd resins for protective coatings are expected to increase in the next few months, representatives of the Chemicals Bureau informed the members of the Alkyd Resins Industry Advisory Committee at a recent meeting, the War Production Board has reported.

Even after victory in Europe is

Hercules Elects McKinney and Billings to Board



Ralph B. McKinney (left) and Dr. Wyly M. Billings, general managers of the paper makers chemical department and synthetics respectively, have been elected to the board of directors of Hercules Powder Co., replacing Charles C. Hoopes and George M. Norman, who are retiring after 32 years of service with Hercules.

achieved, Navy requirements for phthalic alkyd resins are expected to remain at the same high level, the committee was told.

WPB suggested that in view of the critical supply situation, restrictions be placed on the phthalic anhydride content of proprietary paints on much the same basis as military specifications are placed on paints to achieve maximum conservation of the critical chemicals used in their production.

Supplies for Finishes Tight

Supplies of raw materials required for industrial finishes are not expected to improve during the next few months, members of the Paint, Varnish and Lacquer Industry Advisory Committee were told at a recent meeting.

Lacquer solvents, generally, with the possible exception of ethyl acetate, will remain critical and further reductions in civilian allocations may become necessary. All important synthetic resins employed by the industry are in very short supply and no improvement is expected in the near future. Phthalic alkyd resins, already critical, will probably become tighter as a result of increased military requirements. Para phenol and tertiary butyl phenol resins are barely sufficient to care for military requirements. Production of these resins is at a maximum and no relief in supply can be expected.

Rosin modified phenolics have definitely tightened, and will remain in short supply because of the position of phenol and formaldehyde. Drastic allocation cuts may become necessary almost immediately because of the present serious shortage of formaldehyde resulting from transportation difficulties in moving methanol to formaldehyde producers.

Urea and melamine aldehyde resins have had to be denied for many civilian uses because of butyl alcohol, as well as formaldehyde. Maleic anhydride can be expected to continue to be allocated on current policy basis since sizable inventories are on hand.

In general, the over-all pigment situation has deteriorated somewhat in the last few months. Increased military demands and serious manpower difficulties have reduced quantities available for civilian uses. The drastic shortage of white lead is expected to throw an additional load on other white pigments. Synthetic yellow iron oxide is expected to be placed on allocation. Chrome pigments are critical with increasing military demands; expected increased production has not occurred. Concern was expressed by committee members regarding the possibility that the 25 per cent civilian quota might be cut.

War Food Administration representatives told committee members that the general linseed oil supply has reached a low operating level. Because of last year's poor flaxseed yields, it appears that present linseed oil quotas to the protective coatings industry may have to be reduced shortly. No general easing of the linseed oils situation is in prospect at least until late fall when this year's domestic crop is realized. It was pointed out that $30,000,000 has been appropriated to sponsor flaxseed planting, but that it is impossible to say what the effect of this appropriation will mean in terms of more oil for domestic use.

Perry, Underwood Join Phillips Chemical Products Department

Dr. Charles W. Perry (left), formerly chief polymer development branch, Office of Rubber Director, has joined the chemical products department of Phillips Petroleum Co. T. M. Underwood has been transferred from the Borger Refinery to the same department, where he will be occupied with process design and engineering.

Arsenical Insecticide Committee Appointed

Eleven manufacturers of insecticides have been appointed to the Arsenical Insecticide Manufacturers Industry Advisory Committee.

The new committee will discuss pricing problems affecting approximately 16 arsenical insecticide manufacturers. The outlets for their products comprise some 250 mixers, 1,200 wholesalers and 40,000 retailers. The industry is located principally in the northeastern states, the north central states and California.

Maximum prices for arsenical insecticides are contained in two regulations: Revised Maximum Price Regulation No. 315 (Arsenical Insecticides) and Maximum Price Regulation No. 144 (Retail Prices of Agricultural Insecticides and Fungicides).

Following is a list of the members:
Hallam Boyd, Exec. Vice Pres.
Commercial Chemical Co.
J. B. Cary, Pres.
Niagara Sprayer & Chemical Co.
J. J. Haprov, Pres.
Los Angeles Chemical Co.
M. L. Somerville
The Sherwin-Williams Co.
D. I. Trainor, Director, Technical Service
General Chemical Co.
A. J. Flebut, Vice Pres.
California Spray-Chemical Co.
J. M. Fountain, Pres.
Cotton Poisons, Inc.
C. G. Nelander, Mgr., Insecticide Dept.
Corona Chemical Division
Pittsburgh Plate Glass Co.
William Steinschneider, Vice Pres.
Ansbacher-Siegle Corp.
B. P. Webster, Vice Pres.
Chipman Chemical Co.
A. B. Young, Jr., Vice Pres.
Woolfolk Chemical Works, Ltd.

Urge More Phthalic From Xylene

Increasing requirements for phthalic anhydride for use in plasticizers, esters, dye and dye intermediates have brought about a need for increased facilities, the War Production Board told members of the Phthalic Anhydride Industy Advisory Committee at a recent meeting.

In view of this shortage, WPB recommended increased production of phthalic anhydride by means of increased facilities utilizing both ortho-xylene and naphthalene for the production of the chemical.

By the end of 1945, according to current estimates based on all existing and current authorized facilities, the total phthalic anhydride production capacity will be 170,000,000 pounds, WPB said.

WPB pointed out that if annual naphthalene production were increased by about 10,000,000 pounds, it would be possible to have a corresponding increase of phthalic anhydride production from naphthalene of at least 7,000,000 or 8,000,000 pounds a year from any additional phthalic anhydride production facilities.

At WPB's suggestion, the committee agreed to investigate further the possibility of substituting ortho-xylene for naphthalene in the production of phthalic anhydride at the plants now in operation.

Labor Shortage Hits Sodium Bichromate Plants

The current critical shortage of men to staff sodium bichromate plants is holding production at a rate substantially below capacity, the Primary Chromium Chemical Industry Advisory Committee informed the War Production Board at a recent meeting.

Market demands for chrome alloys and pigments have surged upward and WPB has invited producers to submit plant expansion projects in non-critical labor areas for an increase in sodium bichromate production totaling up to 2,000,000 pounds monthly.

Transvaal grade B. Chromite, the preferred raw material of all producers, while available in adequate supply for immediate needs, may become scarce late in 1945 due to ocean shipping and producers were asked to explore possibilities of switching to domestic ores, or imported ores such as Russian or Turkish, which are available.

COMPANIES

Affiliates Merge to Make Marietta-Harmon Chemicals

Two wholly-owned American Home Products Corporation affiliates, Harmon Color Works, Inc., Haledon, N. J., and Marietta Dyestuffs Company, Marietta, Ohio, have been merged to form Marietta-Harmon Chemicals, Incorporated, it was announced recently by Alvin G. Brush, American Home Products Board Chairman.

According to Mr. Brush, the consolidation will bring no change in management, personnel, or plant locations.

Harmon Color Works, acquired by the Corporation in 1942, now is manufacturing war products including dyes for smoke grenades and signal shells; ingredients for incendiary bombs and flame throwers, atabrine and camouflage colors.

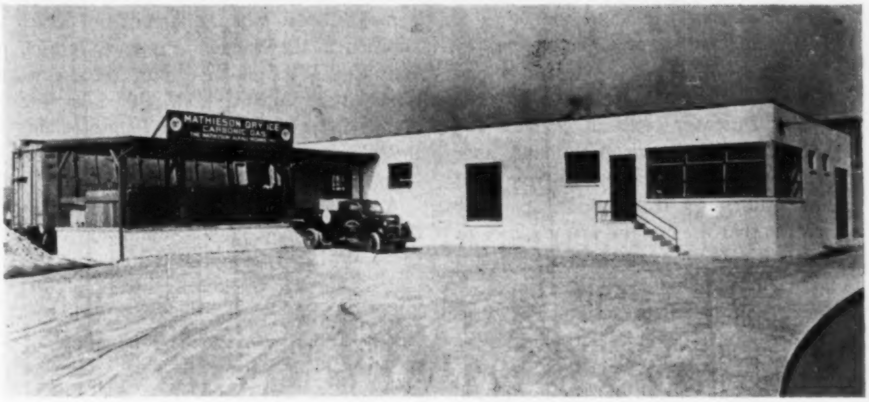
Producers of acid colors and intermediates for the dye industry before the war, the Marietta Company now is a large producer of 2-amino thiazole, a sulfathiazole intermediate; dinitrochlorobenzene, and uniform dyes, for the armed services.

Ranking officers of the new company are George A. LaVallee, chairman of the board; and Victor J. Chartrand, president.

Monsanto Designs Rocket Motors

Monsanto Chemical Company will not only manufacture the launching propellant chemical for American models of the

Mathieson Builds Warehouse



Atlanta warehouse for dry ice and carbonic acid gas, recently completed for Mathieson Alkali Works, at 255 Chester Ave., S. E.

robot bomb, as previously disclosed, but will also be responsible for production of rocket motors used in launching.

The rocket motors were engineered by Monsanto technicians at St. Louis and Dayton, working in cooperation with the National Defense Research Council and the Air Technical Service Command. Subcontractors will fabricate them from steel tubing, following a technique substantially similar to that used in the manufacture of bomb casings.

Earlier it was announced that Monsanto had been authorized to design, build and operate a facility for "production of a new ordnance development," and that the new $3,000,000 plant will adjoin the Longhorn Ordnance Works, which Monsanto operates for Army Ordnance at Karnack, Texas.

Hercules Increases Rocket Powder Production

The production of rocket powder by Hercules Powder Company, operators of the nation's largest rocket powder plants, was increased 400 per cent during the past year and will be substantially increased in 1945.

Although actual figures cannot be given, production of rocket powder is now computed in millions of pounds a month. "Production in 1945 will receive a major boost when a 40 million dollar addition to the Badger Ordnance Works, Baraboo, Wis., swings into full operation," the company said. "Part of the plant will be in operation in February and the plant will be in full operation this summer."

Additional increases in production at the Hercules-operated Sunflower Ordnance Works, Lawrence, Kan., one of the nation's largest smokeless powder plants, are also anticipated. Almost the entire increase in the nation's production of rocket powder during the past year was accomplished at Sunflower. The company statement disclosed that some sticks of rocket powder are five feet long, and that the sticks can be either round or cruciform in shape. Rocket powder contains nearly 50 per cent nitroglycerin, as compared with a maximum of 20 per cent in other powders.

Penn Salt Makes DDT

The Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., has completed the installation of facilities for the manufacture on commercial scale of DDT. Production has already begun, all of the output being taken by the government.

War Department Cites Zanetti

Col. Joaquin E. Zanetti, professor of chemistry and director of the chemical laboratories at Columbia University, has been awarded the Legion of Merit by the War Department, "for exceptionally meritorious conduct in the performance of outstanding services" in chemical warfare.

Pittsburgh ACS Honors Cretcher

Dr. Leonard Harrison Cretcher, assistant director of Mellon Institute and head of its pure chemistry research department, received the ACS 1944 Pittsburgh Award.

Du Pont Forms Technical Division

The formation of a technical division with Donald O. Notman as director, has been announced by F. S. MacGregor, general manager of the Electrochemicals Department. Dr. C. W. Tucker, formerly Peroxygen Products manager in the sales division of the department, will be chemical director. Dr. Sterling Temple, who has been chemical director of the department, will be special assistant to Dr. Tucker.

All research and semi-works activities of the Electrochemicals Department will be coordinated in the new Technical Division, with headquarters in Wilmington.

Dr. Tucker will be succeeded as Peroxygen Products manager by Dr. N. C. Jones, formerly of the Production Division.

Monsanto Plans Melamine Production

Monsanto Chemical Company has announced that it will soon begin volume production of melamine. Construction of a new melamine plant is underway at Monsanto's Merrimac Division, Everett, Mass., where the chemical is now being produced in pilot plant quantities. Moncanto owns the basic patent on melamine formaldehyde resins.

Company Notes

The Cornelius Products Company has established a sales office for the midwestern territory at 14 East Jackson Boulevard, Chicago, Illinois. It will be under the direction of E. Alt.

Wyeth Incorporated, subsidiary of American Home Products Corporation, has opened a branch office and warehouse at 1125 West North Avenue, Baltimore, Maryland. Morris Wolfe has been named manager of the new office.

The Permutit Company has announced the removal of its Los Angeles office to new and larger quarters at 405 South Hill St., Los Angeles 13, California. U. A. Hammett will continue as district manager of this office which covers the company's activities in the Southwest.

The Hercules Powder Company has established its Cellulose Products Department in Chicago as a regular branch office, and has revised territories assigned to the sales and technical service personnel, according to a recent announcement by J. B. Wiesel, director of sales and development for the department. Fred K. Shankweiler, of the New York office, will be manager of the Chicago branch.

ASSOCIATIONS

Associations Appoint Drug Export Committee

Formation of a drug industry export committee consisting of representatives of the American Drug Manufacturers Association, the Proprietary Association of America and the American Pharmaceutical Manufacturers Association recently was announced by R. M. Dunning of Vick Chemical Co., chairman of the group.

To form this committee, each of the associations has appointed five delegates, and two alternates. A monthly meeting schedule has been planned.

Commercial Laboratories Elect Officers

Major W. P. Putman, of the Detroit Testing Laboratory, Detroit, Mich., has been elected president of the American Council of Commercial Laboratories. Other officers elected were: vice-president, H. L. Sherman, of Skinner & Sherman, Inc., Boston, Mass.; secretary, Dr. B. L. Oser, of the Food Research Laboratories, Inc., Long Island City; treasurer, T. A. Wright, of Lucius Pitkin, Inc., New York.

California Salesmen Selects Officers

The Chemical Salesmen's Association of California has elected officers for 1945: John C. Tiedemann, L. H. Butcher Co., president; Peter H. VanDerSterre, Griffin Chemical Co., 1st vice-president; Eugene T. Doyle, Tobacco By-Products & Chemical Corp., Inc., 2nd vice-president; and C. B. Odell, Dow Chemical Co., secretary-treasurer.

Snell Acquires D. Gardner Foulke

Dr. D. Gardner Foulke, recently chief chemist for Garfield Division of Houdaille-Hershey Corp., has joined the staff of Foster Dee Snell, Inc., as Analytical Department director.

Chlorine Institute Re-elects Officers

S. W. Jacobs, of the Niagara Alkali Co., has been re-elected president of the Chlorine Institute. E. C. Speiden, of Innis Speiden & Co., has been re-elected vice-president and Robert T. Baldwin has been renamed secretary-treasurer.

The following directors were elected for two years: Thomas Coyle, E. I. du-Pont de Nemours & Co., Inc., Electrochemicals Dept.; W. I. Galliher, Pittsburgh Plate Glass Co.; Louis Neuberg, Westvaco Chlorine Prod. Corp.; E. E. Routh, The Mathieson Alkali Works, Inc.; B. P. Steele, Pennsylvania Salt Mfg. Company; Eli Winkler, Southern Alkali Corporation.

The hold-over directors are: George M. Dunning, Wyandotte Chemicals Corporation; F. W. Fraley, Jr., Diamond Alkali Company; R. W. Hooker, Hooker Electrochemical Company; S. W. Jacobs, Niagara Alkali Company; E. C. Speiden, Isco Chemical Division of Innis, Speiden & Co.

Chemical Industry Honors Baekeland

Leo Hendrik Baekeland was the general subject of a meeting of the Society of Chemical Industry, which followed a memorial dinner, February 9.

PERSONNEL

Urquhart Heads Wilmington Chemical

G. Gordon Urquhart has been named president of the Wilmington Chemical Corp., manufacturers of chemicals for the rubber industry. Mr. Urquhart, formerly vice-president of National Foam System, Inc., succeeds Herbert Waller, who recently resigned. Henrik J. Krebs, who has been associated with the firm as secretary and director, becomes treasurer to succeed A. D. Bestebreurtje, also resigned.

Paul Slawter Cited

First Lieutenant Paul B. Slawter, Jr., who until he joined the Army Air Corps in February 1943 was associate editor of Chemical Industries, has been six times decorated for "courage and skill" in aerial combat. Lieutenant Slawter is a navigator on an Eighth Air Force B-97 Flying Fortress and has recently completed more than thirty flights over enemy territory.

Battelle Institute Increases Staff

Dr. Frank A. Gilbert has been named to the staff of Battelle Institute, Columbus, Ohio, where he will be engaged in research in plant nutrition and other phases of agricultural chemistry. Dr. Gilbert was professor of botany at Marshall College, Huntington, West Virginia, before serving as a Major in the Army, from which he has recently been honorably discharged.

Dr. John W. Clegg, formerly research chemist with E. I. duPont de Nemours and Company, has been appointed to the staff of the Institute, and will be engaged in research in organic chemistry.

William H. Safranek, Jr., a former chemist at the Apollo Metal Works, Clearing, Illinois, will be employed in electrochemical research.

Bowen Joins Vacuum Engineering

Vacuum Engineering Division of National Research Corp. has announced the appointment to its sales staff of E. C. Bowen. Formerly Eastern divisional sales manager for Central Scientific Co. of Chicago, Mr. Bowen will deal with industrial applications of low pressure.

Fischelis Leaves WPB

The resignation of Robert P. Fischelis, director of the Chemicals, Drugs and Health Supplies Divisions in the Office of Civilian Requirements, has been announced by W. Y. Elliot, vice chairman for Civilian Requirements of the War Production Board.

Before joining WPB, Dr. Fischelis was secretary and chief chemist of the Board of pharmacy of the State of New Jersey. He is leaving WPB to become secretary and general manager of the American Pharmaceutical Association at its headquarters building and laboratory in Washington, D. C.

George K. Hamill has been named acting director of the Division to succeed Dr. Fischelis, who will continue to serve in the capacity of consultant.

Chemist Joins Mellon Institute

Dr. Paul Hugh Emmett, who has distinguished himself by his researches on catalysis, has been added to the investigational staff of Mellon Institute.

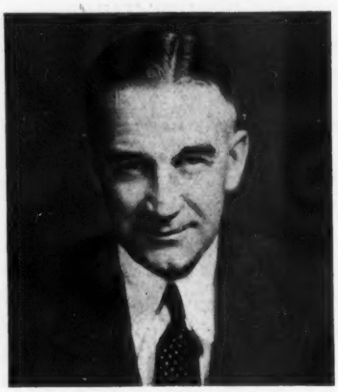
From 1937 until his appointment at the Institute he was professor of chemical and gas engineering at Johns Hopkins University and also consultant of the U. S. Department of Agriculture. Recently he has been active in wartime essential research for the U. S. Government, on leave of absence from Johns Hopkins.

Standard Oil Raises Thiede

William F. Thiede has been appointed manager of the New Jersey works of Standard Oil Co. of New Jersey, succeeding the late G. H. Mettam, according to an announcement by J. R. Carringer, general manager of the company's East Coast manufacturing operations.

The New Jersey Works includes refineries at Bayway, Bayonne, and the Eagle Works in Jersey City. Mr. Thiede was formerly assistant manager.

National Carbon Elects



C. O. Kleinsmith has been elected vice-president of National Carbon Corp. He has announced the appointment of D. B. Joy as general sales manager for carbon products.

Personnel Notes

LT. COL. JOHN E. DEVINE of the Chemical Warfare Service, recently returned from the European war theatre, and now placed on inactive reserve status, has returned to the Standard Alcohol Co., where he will assume the position of sales manager for the midwestern territory.

EDWARD REMUS has resigned as president and treasurer of Standard Synthetics, Inc., with whom he has been identified since the establishment of that company in this country, in order to head his own company, Edward Remus & Co., Inc., with main offices at 11 West 42nd St., New York City.

DR. HARRY KAPLAN, formerly of the Winthrop Chemical Co., has been engaged by the Apex Chemical Co., to supervise research for the Petroleum Solvents Corp.

Columbia Promotes Johnson

Walter E. Johnson has been appointed district sales manager for the Columbia Chemical Division, Pittsburgh Plate Glass Company.

R. V. WILSON has been appointed director of customer service of Continental Can Company's research department, succeeding Mr. L. F. Pratt who has resigned to take a position with Hunt Brothers, Hayward, California.

REUBEN G. GUSTAVSON, president of the University of Colorado and biochemist, has been appointed Dean of the Faculties of the University of Chicago, effective July 1, President Robert M. Hutchins has announced.

BART SHEEHAN has resigned from the Grasselli chemicals department of E. I. du Pont de Nemours & Co., to become affiliated with the New York sales department of Arnold, Hoffman Company.

CORRECTION: R. P. Neptun has been appointed field sales manager for S. B. Penick & Co. The impression might have been gained from the January issue, that he is connected exclusively with the advertising department.

CHEMICAL SPECIALTIES NEWS

Vitamin Institute Starts

Forty companies which manufacture vitamins have joined together to form the Vitamin Research Institute of the United States. The Institute proposes to recommend proper standards and terminology for use in connection with manufacture and sale of vitamins. Dr. Theodore Klumpp, president of Winthrop Chemical Co., has been chosen chairman of the board of governors. Elmer Bobst, former president of Hoffman-LaRoche, will act as chairman of the executive committee. The Institute plans grants to conduct investigations and research, and will also establish scholarships and fellowships.

8,000,000 Spent on Research

The 220 members of the Proprietary Association of America manufacture and market approximately 85 per cent of the medicinal preparations for use by the layman for the relief of simple ailments. In 1944, these manufacturers of packaged medicines spent, in the aggregate, approximately $7,750,000 for research looking to the development of new medicinal products, confirming the scientific validity of existing products and controlling their manufacturing processes. The sum was divided in the following manner:

For control laboratories and testing	$1,750,000
For product study and development	5,000,000
For fellowships, grants and other research	1,000,000

Stearns Adopts Safety Color System

Plant modernization now under way at the Frederick Stearns & Company Division, Sterling Drug, Inc., has resulted in adoption of a color scheme which is minimizing factory fatigue and improving safety records.

Color standards adopted call for an application of grey dado 51 inches from the floor, with white walls and ceilings. All machines have a six inch black foot, with light grey enamel to the waist or working height. All working surfaces are of a buff color. Fluorescent lighting is being installed with 40 candle power at work level.

Working space is further brightened by a code for coloring the different pipes throughout the plant, a feature which primarily makes for engineering and maintenance efficiency. Standard colors are used on the pipes, with red for sprinkler; green for steam; grey, hot water; yellow, cold water; blue, compressed air; maroon, gas; black, electrical; aluminum, vacuum; and white, process.

New Name Announced

The Specialties Manufacturing Co., Bloomfield, New Jersey, subsidiary of Walter Kidde & Company, Inc., has been renamed the Kidde Manufacturing Co., Inc., according to an announcement by Walter H. Freygang, president of the firm. The company is a peacetime manufacturer of syphon bottles and their supercharger cartridges. The cartridges, containing highly compressed carbon dioxide, are now used altogether to inflate Mae West lifejackets and the new polo-type lifebelts.

Roxalin Acquires Schwencke

Dr. Edmund H. Schwencke, previously consulting industrial chemist in New York has been engaged as director of plastic research for Roxalin Flexible Finishes, Inc.

Office of Pharmacal Information Opens

Establishment of an Office of Pharmacal Information by The Proprietary Association of America has been announced by Dr. Frederick J. Cullen, vice-president. The OPI, with headquarters in New York and Washington, represents the major activity in the continuation of the Association's public relations program for 1945. One service of the new office will be the publication of news letters dealing with research.

Drug Distribution Map

The N.W.D.A. has recently presented a revised distribution map and accompanying handbook to the drug industry in an effort to promote more economic, scientifically planned distribution. The map outlines 36 areas which are 90 per cent or more self-contained as to the flow of goods from service wholesale druggists to retailers.

With this information analysis of potential markets can be made and sales quotas and market potentials determined by territories, districts, divisions and areas. Sales accounting statistics can be set up on a county basis, areas basis, etc., and a measurement of performance against quotas or potentials made.

New Specialty Firm

A new company, Canadian Insecticide and Chemical Co., Ltd., Toronto, has been formed to distribute in Canada the 2-Way insecticidal products of Nash & Kinsella Laboratories, Inc., St. Louis. Associated with the new organization are: W. K. Nash and Dr. Hugo Preis, St. Louis; John A. Chantler and E. W. Chantler, Toronto.

For the duration of the war the company plans to confine its activities to handling the Canadian distribution of Nash and Kinsella specialties, but later expects to go more fully into the chemical field in cooperation with its U. S. A. affiliates.

PPG Will Be New Insignia

The Pittsburgh Plate Glass Co. has adopted a new official insignia consisting of the letters PPG interlocked, in order to facilitate the ready recognition of its varied paint, glass, brush, chemical and plastic products. This insignia will appear on all labels and other means of product identification, advertisements, letterheads, packages, and signs.

New Plastic Sprayer

A new plastic sprayer has been developed by the Wilco Co. which is competitive in price with the prewar metal variety. It is light in weight and will not corrode. Molded from non-toxic material, it may be used to dispense medicaments, cosmetics and chemicals. Different sizes and colors are available.

Prevents Fungi Growth

To combat the growth of fungi in tropical climates, Westinghouse electrical apparatus is being given treatment based on the experience of the U. S. Military Services. The last varnish treatment applied to motors, control apparatus, and radio equipments, has added to it a small amount of substance toxic to fungus. This substance develops a very low but continual vapor pressure adequate to prevent fungi from taking root on the surface.

WAR REGULATIONS SUMMARY

ALKYD RESINS—Beginning with March allocations, use of phthalic alkyd resins is being restricted to interior can and interior closure coatings for food, medicinal and chemical purposes.

ALKYD RESINS—Consumers of phthalic alkyd resins are now required to submit a purchase order to their resin supplier together with the copy of their allocation request.

AMMONIUM NITRATE—The new Canadian grade containing 33.5% nitrogen has been assigned a retail ceiling price of $1.70 more per ton that the 32.5% grade.

ANTI-FREEZE—Ceiling prices for retail sales of glycerine-base anti-freezes have been set at $2.65 a gallon if they contain 95% or more of glycerine by volume. If less than 95% glycerine, the ceiling price is computed on the basis of percent glycerine.

CAFFEINE AND THEOBROMINE—Allocation control transferred to Schedule 89, Order M-300.

CHROMIUM CHEMICALS — Increases ranging from 25 to 75 cents per 100 lbs. in maximum prices for primary chromium chemicals were announced February 13 by OPA. The increase will be absorbed by industrial users of these chemicals. (Maximum Price Regulation 575, Primary Chromium Chemicals, effective Febuary 17, 1945.)

CAMELBACK—Direction 9 to Rubber Order R-1 has been revised so as to continue manufacture of Grade C (30% reclaim) camelback in place of prohibited Grade A (GRS).

ETHYL ETHER—Placed under allocation control of Schedule 91, Order M-300, effective March 1. Small-order exemption 1,240 lbs. per month.

FREON—Amended Order M-28 permits use of Freon 12 for any refrigeration or air conditioning system except those included in List A of the order.

LEAD — Use in certain non-essential items prohibited, but liberalized in several critical fields, notably rubber-curing processes, plastics, abrasives and grinding wheels.

NITROCELLULOSE PLASTICS—Placed under control of WPB Order M-340 governing miscellaneous chemicals.

NITROGEN COMPOUNDS—Three minor changes have been made in Schedule 80 (Nitrogen Compounds), Order M-300: Definition of nitrogen compounds amended to substitute aqua ammonia for B liquor. Suppliers now permitted to list prospective customers on Form WPB-2947, and required to report on this form actual shipment to each listed customer during the previous month.

PHOSPHATE ROCK—A price increase of 10 cents a ton at the miner's level was announced February 13 by OPA. The increase will be absorbed by distributors and will not affect retail prices.

QUEBRACHO—Grinders and liquefiers of imported solid quebracho extract have been granted new ceiling prices as follows (per 100 lbs.) : ground clarified extract, 70% tannin, 90 cents; ground extract, no tannin basis, 83 cents; liquid extract, 35% tannin, 45 cents.

ROSIN—Gum and wood rosin placed under control of WPB Order M-340 governing miscellaneous chemicals.

WAXES—Importers who add to maximum purchasing prices shipping charges resulting from use of ocean points or origin more distant than the point customarily used must file certain information with national OPA office within two weeks of the foreign purchase.

YELLOW IRON OXIDE PIGMENTS—Placed under allocation control of Schedule 90, Order M-300. Allocation Order M-383 revoked.

CANADIAN NEWS

by W. A. JORDAN

Professional Workers Get Separate Status

Professional workers, including chemists, engineers and architects, as a result of an appeal to the National Labor Relations Board to be excluded from the collective bargaining items of the Canadian Labor Code, have been placed under a special section of the Code for a period of at least six months.

Under this special section professional workers are not bound by the vote of other workers in the plant for union representation, but may choose their own representation. The separate status was granted despite union opposition but is subject to review by the NLRB in six months.

When the present code was first introduced, the professional groups made a similar request and were temporarily classed as confidential workers who are not subject to the collective bargaining terms of the Code. Representatives of the group have now proposed to the Board that an entirely separate code and organization be set up to deal with professional workers. However, the Board in its report to the minister said such a plan would involve substantial expenditures.

Chemical Imports Up

Canadian imports of chemicals, almost 90 per cent of which are from the U. S. A., totalled $81,000,000 during 1944, up $10,-300,000 over 1943, according to the Dominion Bureau of Statistics. The total is more than double average prewar figures, and naturally includes a lot of war materiel.

Imports for the year, by main groups, in millions of dollars, and with 1943 totals bracketed, are as follows: Acids, $3.3 ($4.3); cellulose products, $4.9 ($4.8); drugs and medicines, $7.6 ($7.3); dyeing and tanning materials, $7.0 ($7.5); fertilizers, $4.3 ($3.9); paints and varnishes, $7.5 ($6.2); inorganic chemicals, $12.0 ($12.8); soda compounds, $4.6 ($4.7).

First DDT Unit Due

Plans for the commercial production of DDT in Canada are maturing at press date, and it is anticipated that the Dominion's first DDT unit will be in operation in the near future. Research on this subject has been intensively pursued by several chemical companies in Canada during the past year, and although a few hundred pounds of the insecticide has been made in various laboratories, no commercial installation has been effected.

In that the Canadian chemical industry does not produce either of the basic raw materials for DDT manufacture, initial production will be based on imported reagents. In the future, however, it is probable that acetaldehyde-based chloral, at least, will be available from domestic sources.

Elected President of Standard Chemical

Commander K. S. Maclachlan of Montreal has been elected president and appointed general manager of Standard Chemical Co., Ltd., succeeding E. P. Taylor, who becomes chairman of the board. Prior to active duty with the Royal Canadian Navy, Commander Maclachlan served as Deputy Minister of National Defense for Canada and was president and general manager of Fraser Companies, Ltd., and Restigouche Co., Ltd.

Consolidated to Make Sodium Silicofluoride

Consolidated Mining and Smelting Co. of Canada Ltd. has installed a unit at its Warfield, B. C. phosphate plant for the manufacture of commercial sodium silicofluoride. Rated capacity of the installation is placed at 1,500 to 2,000 tons of the silicofluoride per annum.

Hitherto, this chemical has not been manufactured in Canada, and most of the Dominion's requirements have been imported, since the outbreak of war, from the U. S. A.

The present Canadian market for the chemical, in enameling, laundry, and such consuming industries, is not large, and as yet insecticide manufacturers still rely mainly on the straight imported fluoride rather than the silicofluoride. Consolidated's plant is therefore able to more than accommodate domestic market needs. Primary attention will be given to the export market, to which some shipments have already been made.

Merck To Expand

Merck & Co., Ltd., Canadian subsidiary of Merck & Co., Inc., Rahway, N. J., has purchased a tract of 210 acres at Valleyfield, Quebec, to serve as a site for the postwar expansion of the company's activities, according to an announcement made at the recent annual meeting of the shareholders.

Managing Director R. I. Hendershott states that the company, currently engaged in the manufacture of penicillin, vitamins, sulfa drugs, and other fine and medicinal chemicals, is rapidly outgrowing its Montreal facilities, and construction of a Valleyfield unit will be initiated as soon as building conditions permit.

It is anticipated that the Valleyfield project will be developed gradually, and that manufacturing operations will also be carried on for some time to come at the Montreal plant.

Provincial Government to Make Chemicals

The CCF government of Saskatchewan is planning to enter the chemical manufacturing field, according to reports from its department of natural resources.

The main project under consideration is the production of high grade briquettes and chemical byproducts from lignite coal in the south Saskatchewan lignite fields. The unit is to be financed by funds to be obtained from the million dollar "Security Bond" drive launched last month.

A small briquetting plant has been in operation at Bienfait, Sask., for some time, but only some 100,000 tons of coal has been processed annually and no byproducts other than creosote have been recovered. The government-sponsored unit is to be designed on a larger scale, and production of lignite oils, creosote, ammonia, nitric acid, and "plastics" is said to be planned.

As a second project the department of natural resources has announced its planned construction of a 2,000 bushel per day, wheat-based unit for the manufacture of laevo-2,3-butylene glycol for sale as antifreeze.

Plastics Society Elects

The Canadian Section of the Society of Plastics Industry, at its convention last month, elected Lloyd J. Falkenhagen, Welland, as chairman for 1945. Other elections were: vice-chairman, John D. Benedito, Montreal; secretary, J. H. McCready, Montreal.

CHEMICAL ECONOMICS & STATISTICS

Rayon Production

In the 1944 Statistical Supplement to the Rayon Organon is contained basic annual and monthly rayon yarn and staple fiber data as well as pertinent cotton, wool and silk statistical information. These data do not include data on the non-cellulose, man-made fibers now being produced in this country, such as nylon, Vinyon, casein and protein fibers, and spun glass.

The rayon statistics represent a 100 per cent coverage of the industry. With few exceptions, operating data for the various rayon processes are shown separately. Data on cuprammonium process yarn, however, have been grouped with similar viscose process yarn data so as not to disclose individual company operations. Also, the acetate process staple fiber and the viscose staple fiber have been combined for the same reason. The production of rayon waste, as well as the production of rayon monofilament, is not covered by these data.

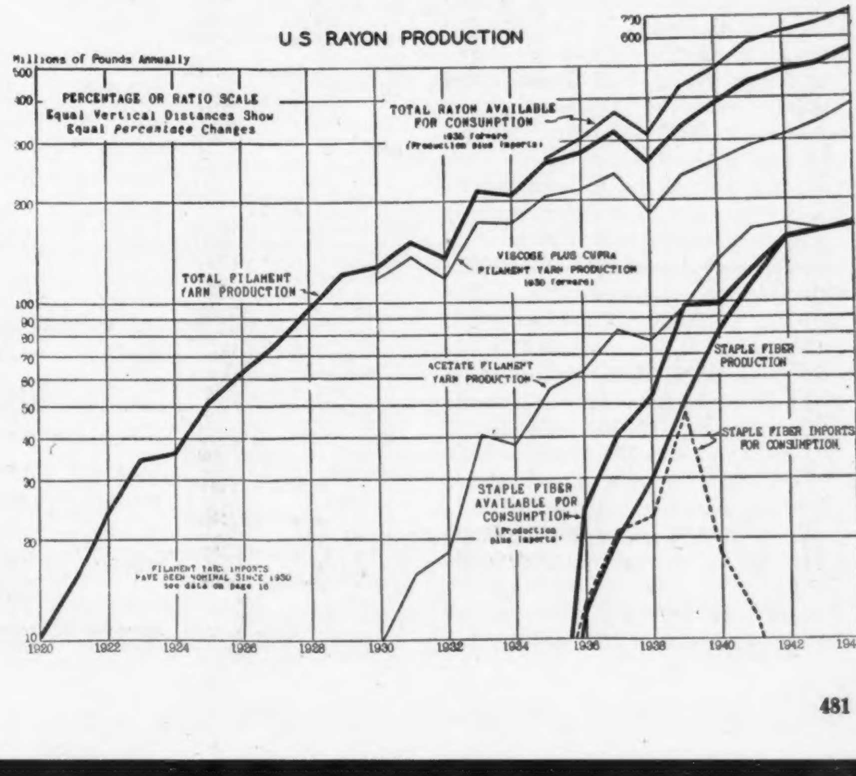
The 1944 United States output of rayon at 723,900,000 pounds represented a new high record, exceeding the 1943 total of 663,100,000 pounds by 9 per cent.

Of the 1944 total, the viscose-cuprammonium filament yarn production at 383,-511,000 pounds was up 13 per cent over the 1943 figure of 338,511,000 pounds; this increase was entirely due to the expanded rayon tire yarn program. Acetate filament yarn output totaled 171,706,000 pounds, 6 per cent over the 1943 production of 162,614,000 pounds. Production of rayon staple fiber increased by 4 per cent, going from 162,019,000 pounds in 1943 to a 1944 total of 168,740,000 pounds. Rayon production was somewhat held back during 1944 by raw material shortages, mainly those used in the acetate rayon process.

Basic Annual U. S. Rayon Data[1]
(Units Are Thousands of Pounds and *Percent*)

Year	Production, Filament Yarn: Viscose Cupra & Nitro[2] lbs.	%	Acetate[3] lbs.	%	Total lbs.	%	Total Staple Fiber[3] lbs.	Grand Total Rayon lbs.
1911	363	*100*	......	...	363	*100*	......	363
1912	1,111	*100*	......	...	1,111	*100*	......	1,111
1913	1,816	*100*	......	...	1,816	*100*	......	1,816
1914	2,422	*100*	......	...	2,422	*100*	......	2,422
1915	3,885	*100*	......	...	3,885	*100*	......	3,885
1916	5,778	*100*	......	...	5,778	*100*	......	5,778
1917	6,544	*100*	......	...	6,544	*100*	......	6,544
1918	5,846	*100*	......	...	5,846	*100*	......	5,846
1919	8,228	*99.4*	50	*0.6*	8,278	*100*	......	8,278
1920	10,005	*98.8*	120	*1.2*	10,125	*100*	......	10,125
1921	14,866	*99.2*	120	*0.8*	14,986	*100*	......	14,986
1922	23,947	*99.5*	120	*0.5*	24,067	*100*	......	24,067
1923	34,839	*99.7*	120	*0.3*	34,959	*100*	......	34,959
1924	36,208	*99.7*	120	*0.3*	36,328	*100*	......	36,328
1925	49,429	*96.8*	1,620	*3.2*	51,049	*100*	......	51,049
1926	60,073	*95.8*	2,620	*4.2*	62,693	*100*	......	62,693
1927	70,408	*93.2*	5,147	*6.8*	75,555	*100*	......	75,555
1928	91,232	*93.8*	6,000	*6.2*	97,232	*100*	165	97,397
1929	112,954	*93.0*	8,445	*7.0*	121,399	*100*	500	121,899
1930	117,543	*89.6*	9,790	*10.4*	127,333	*100*	350	127,683
1931	135,249	*89.6*	15,630	*10.4*	150,879	*100*	880	151,759
1932	116,379	*86.4*	18,291	*13.6*	134,670	*100*	1,100	135,770
1933	172,402	*80.8*	41,096	*19.2*	213,498	*100*	2,100	215,598
1934	170,307	*81.8*	38,014	*18.2*	208,321	*100*	2,200	210,521
1935	202,010	*78.4*	55,547	*21.6*	257,557	*100*	4,600	262,157
1936	214,926	*77.4*	62,712	*22.6*	277,638	*100*	12,300	289,938
1937	239,316	*74.4*	82,365	*25.6*	321,681	*100*	20,244	341,925
1938	181,470	*70.4*	76,155	*29.6*	257,625	*100*	29,861	287,486
1939	231,283	*70.4*	97,342	*29.6*	328,625	*100*	51,314	379,939
1940	257,124	*65.9*	132,947	*34.1*	390,071	*100*	81,098	471,169
1941	287,459	*63.7*	163,745	*36.3*	451,204	*100*	122,026	573,230
1942	310,475	*64.8*	168,855	*35.2*	479,330	*100*	153,285	632,615
1943	338,511	*67.6*	162,614	*32.4*	501,125	*100*	162,019	663,144
1944	383,511	*69.1*	171,706	*30.9*	555,217	*100*	168,740	723,957

Source: Textile Economics Bureau, Inc., the Rayon Organon.
Notes to above table:
[1] Data shown cover only rayon filament yarn and rayon staple fiber; other primary rayon products such as rayon producers' waste, bands and strips, and monofil are not included. All data shown, however, are on an 100-per-cent basis.
[2] Since 1934 the data in this column include only the production of filament yarn by the viscose and cuprammonium processes, nitrocellulose yarn production having been discontinued in 1934. The viscose and cupramonium data have been combined to avoid disclosure of individual company operations.
[3] Acetate yarn and staple fiber production are partially estimated. Acetate staple fiber production is combined here with the viscose staple fiber production.



Natural Gas

The demand for natural gas expanded further in 1943 in response to greater industrial and other wartime activities. Marketed production was 3,414,689,000,-000 cubic feet, 12 per cent more than the 1942 record, according to the Bureau of Mines, United States Department of the Interior. Gains were recorded in all producing States except six whose output and available gas reserves are small. The output of each of the leading producing states — Texas, Louisiana, and California—increased 13 per cent over 1942, and collectively, these states furnished 67 per cent of the total United States production in 1943. It is esti-

mated that marketed production in 1944 will be 9 per cent greater than in 1943.

Consumption (marketed production less exports) increased 12 per cent from 3,044,773,000,000 cubic feet in 1942 to 3,403,479,000,000 in 1943. The major classes of consumers increased their takings over 1942 as follows: domestic 6 percent, commercial 12 per cent, and total industrial 13 per cent. The trends of gas utilization by different industries varied widely, as indicated by declines of 6 per cent by carbon black manufacturers and 20 per cent by portland-cement plants; in contrast to gains of 23 per cent by miscellaneous industrial users and 26 per cent by electric public-utility power plants (including minor but indeterminate amounts of manufactured gas) as reported by the Federal Power Commission.

The major classes of consumption were as follows: Domestic, 529,444,000,000 cubic feet (16 per cent of total consumption); commercial, 204,793,000,000 cubic feet (6 per cent); field use, 780,986,000,000 cubic feet (23 per cent); carbon black manufacture, 315,562,000,000 cubic feet (9 per cent); fuel at petroleum refineries, 243,584,000,000 cubic feet (7 per cent); and other industrial uses including gas used at public-utility power plants, 1,329,110,000,000 cubic feet (39 per cent).

The average value of gas at the wells was 5.2 cents a thousand cubic feet compared with 5.1 cents in 1942. Values were higher, or unchanged, in all leading states except California. The average value at points of consumption decreased 0.4 cent to 22.3 cents a thousand cubic feet. Domestic consumers paid an average of 0.7 cent a thousand cubic feet less for gas in 1943 than in 1942, commercial consumers 0.9 cent less, and total industrial (except field) users 0.3 cent more. Average consumption per domestic and commercial meter was 5 per cent larger in 1943 than in 1942.

Of the 10,353,870 domestic and 811,090 commercial consumers in 1943, 2,489,100 and 133,130 respectively used mixed gas. The decline from 2,514,460 domestic and 138,040 commercial consumers using mixed gas in 1942 resulted from transfer of a large group of meters in New York State from mixed gas to manufactured gas in 1943. The amount of natural gas used with manufactured gas increased 10 per cent in 1943 over 1942 (84,853,000,000 cubic feet compared with 77,259,000,000).

Exports to Mexico increased 29 per cent from 8,572,000,000 cubic feet in 1942 to 11,079,000,000 in 1943. Shipments to Canada were 131,000,000 cubic feet in 1943 compared with 130,000,000 in 1942. The interstate movement of natural gas (including exports) continued its rapid growth in 1943 to exceed 990,000,000,000 cubic feet, an average of 2,714,000,000 per day.

There were 2,290 gas wells reported drilled compared with 2,597 in 1942.

Chemicals: United States Production, Consumption, and Stocks, November 1944

Statistics on the production, consumption and stocks of chemicals shown in the following table supplement the 1941-1943 figures released February 7, 1944, in "Facts for Industry," Series 6-1-1. Figures for earlier months, information on the number of plants manufacturing each chemical, and a discussion of the limitations of the data are given in the above-mentioned publication. The production figures represent primary production and do not include purchased or transferred material. The consumption statistics are for consumption only in the plants where each chemical is produced. The stocks figures represent the quantities of each chemical on hand at the end of the month at producing locations only.

		November (Preliminary)			*October (Revised)*		
Chemical and Basis	*Unit*	*Production*	*Consumption in producing plants*	*Stocks at producing plants, end of month*	*Production*	*Consumption in producing plants*	*Stocks at producing plants, end of month*
Acetylene:							
For use in chemical synthesis	M cu. ft.	(1)	(1)	(1)	(1)	(1)	(1)
For commercial purposes	M cu. ft.	(1)			(1)		
Aluminum chloride:							
Anhydrous and crystal (100% $AlCl_3$)[2]	M pounds	5,406	(3)	3,105	4,892	(3)	2,692
Solution (32° Be[1])[2]	M pounds	944	....	399	1,029	....	425
Aluminum sulfate:							
Commercial (100% $Al_2(SO_4)_3$)[2]	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Iron free (100% $Al_2(SO_4)_3$)[2]	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Synthetic anhydrous ammonia (100% NH_3)	Short tons	49,721	32,075	5,064	49,113	32,136	4,802
Ammonium chloride (100% NH_4Cl)[2]	M pounds	5,772	....	2,486	5,646	....	2,063
Barium sulfate (Blanc fixe[1]) (100% Ba SO_4)[2]	M pounds	5,000	3,678	3,681	5,152	3,778	3,352
Bleaching powder (35-37% Available Cl_2)	M pounds	2,680	....	1,080	2,702	....	864
Calcium acetate (80% $Ca(C_2H_3O_2)_2$)	M pounds	1,190	(3)	385	*1,067	(3)	*236
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M pounds	2,038	(3)	14,549	608	(3)	13,075
Calcium carbide (Commercial)	Short tons	(1)	(4)	(1)	(1)	(4)	(1)
Calcium hypochlorite (true) (70% Available Cl_2)	M pounds	1,152	(3)	671	1,249	(3)	731
Calcium phosphate:							
Monobasic (100% $CaH_4(PO_4)_2$)	M pounds	5,949	(3)	5,653	4,713	(3)	5,010
Dibasic (100% $CaHPO_4$)[2]	M pounds	3,910	(3)	2,481	3,535	(3)	2,056
Carbon, activated[2]	M pounds	5,190	(3)	5,454	5,062	(3)	4,202
Carbon black (Channel):							
Rubber grade[2]	M pounds	33,463	....	48,556	34,537	....	62,418
Other than rubber grade[2]	M pounds	3,449	....	17,665	4,381	....	19,620
Carbon dioxide:							
Liquid and gas	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Solid (dry ice)	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Chlorine	Short tons	101,999	59,672	5,059	103,517	56,694	4,966
Chrome green (C. P.)	M pounds	704	94	1,092	624	88	951
Chrome yellow and orange (C. P.)[2]	M pounds	2,984	390	2,315	2,558	319	2,422
Copper acetoarsenite (Paris green)[2]	M pounds	(1)	(3)	(1)	(1)	(3)	(1)
Hydrochloric acid (100% HCl)	Short tons	35,106	20,885	3,590	34,454	19,750	3,261
Hydrogen	Millions of cubic feet	(1)	(1)	(4)	(1)	(1)	(4)
Hydrogen peroxide (100 volumes)[2]	M pounds	2,578	186	937	2,575	99	1,212
Lamp black[3]	M pounds	1,090	(3)	1,608	1,017	(3)	1,545
Lead arsenate (acid and basic)	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Lead oxide:							
Red (C. P.)	M pounds	9,101	330	4,636	8,770	590	4,159
Yellow (C. P.)[2]	M pounds	32,497	6,274	10,293	31,870	8,885	11,044
Methanol:							
Natural (80% CH_3OH)	M gallons	361	(4)	260	382	(4)	264
Synthetic (100% CH_3OH)	M gallons	6,363	(3)	2,388	5,671	(3)	1,851
Molybdate chrome orange (C. P.)	M pounds	112	3	140	107	7	132
Nitric acid (100% HNO_3)	Short tons	42,571	37,899	6,249	41,955	37,037	5,795
Nitrous oxide	M gallons S.T.P.	(1)	....	(1)	(1)	....	(1)
Oxygen	M cu. ft.	(1)	(1)	(3)	(1)	(1)	(3)
Phosphoric acid (50% H_3PO_4)	Short tons	54,558	50,188	11,684	*52,487	*48,143	*12,892
Potassium bichromate and chromate (100%)	M pounds	486	(3)	515	*674	(3)	*508
Potassium hydroxide (caustic potash) (100% KOH)	Short tons	3,867	750	1,507	3,667	652	1,183
Soda ash (Commercial sodium carbonate):							
Ammonia soda process—							
Total wet and dry (98-100% Na_2CO_3)[5]	Short tons	374,453	....	....	379,472	....	....
Finished light (98-100% Na_2CO_3)[6]	Short tons	197,154	51,740	24,802	203,265	47,680	24,312
Finished dense (98-100% Na_2CO_3)	Short tons	124,415	2,854	14,923	123,025	2,549	12,801
Natural[7]	Short tons	14,752	(3)	2,515	15,978	(3)	3,610
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	12,840	(3)	4,460	12,422	(3)	4,936
Sodium bichromate and chromate (100%)	Short tons	6,663	(3)	780	*6,866	(3)	*829
Sodium bisulfite (100% $NaHSO_3$)[2]	M pounds	2,826	(3)	840	3,284	(3)	1,398
Sodium hydrosulfide (100% NaSH)[2]	M pounds	1,869	(3)	1,157	1,811	(3)	1,119
Sodium hydrosulfite (100% $Na_2S_2O_4$)[2]	M pounds	3,098	(3)	2,243	3,317	(3)	2,379
Sodium hydroxide (caustic soda):		[8]32,401		[8]57,479	[8]34,285		[8]59,388
Electrolytic process—							
Liquid (100% NaOH)	Short tons	[8]99,428			*[8]100,879		
Solid (100% NaOH)[2]	Short tons	16,837			16,491		

Chemicals: United States Production, Consumption, and Stocks, November 1944 (cont'd)

Chemical and Basis	Unit	November (Preliminary) Production	November (Preliminary) Consumption in producing plants	November (Preliminary) Stocks at producing plants, end of month	October (Revised) Production	October (Revised) Consumption in producing plants	October (Revised) Stocks at producing plants, end of month
Sodium Hydroxide (cont'd)							
Lime-soda process—							
Liquid (100% NaOH)	Short tons	[8]59,314			[8]56,618		
Solid (100% NaOH)[2]	Short tons	18,390			19,191		
Sodium phosphate:							
Monobasic (100% NaH_2PO_4)	Short tons	(1)	(3)	(1)	(1)	(3)	(1)
Dibasic (100% Na_2HPO_4)	Short tons	(1)	(3)	(1)	(1)	(3)	(1)
Tribasic (100% Na_3PO_4)	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Meta (100% $NaPO_3$)[2]	Short tons	(1)	(3)	(1)	(1)	(3)	(1)
Tetra (100% $Na_4P_2O_7$)[2]	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Sodium silicate:							
Soluble silicate glass, liquid and solid (anhydrous)	Short tons	39,387	(4)	44,654	36,757	(4)	43,506
Sodium sulfate:							
Anhydrous (refined) (100% Na_2SO_4)	Short tons	(1)	(3)	(1)	(1)	(3)	(1)
Glauber's salt (100% $Na_2SO_4 \cdot 10H_2O$)[2,7]	Short tons	(1)	(3)	(1)	(1)	(3)	(1)
Salt cake (crude) (commercial)[2,7]	Short tons	(1)	(3)	(1)	(1)	(3)	(1)
Sulfur dioxide	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Sulfuric acid:[7]							
Total (100% H_2SO_4)	Short tons	820,958	....	....	814,871	....	....
Chamber process (100% H_2SO_4)	Short tons	279,515	....	216,230	*284,740	....	213,457
Contact process (100% H_2SO_4)[9]	Short tons	541,443			*530,131		
Net, contact process (100% H_2SO_4)[9,10]	Short tons	467,447	....	....	*543,776	....	....
White lead:							
Basic lead carbonate (C. P.)	Short tons	7,055	2,757	3,934	7,493	3,065	3,521
Basic lead sulfate (C. P.)	Short tons	1,283	....	285	1,387	....	285
Zinc yellow (zinc chromate) (C. P.)	Short tons	1,254	(3)	535	1,235	148	495

[1] Data by months are collected on a quarterly report form and are presented in releases in this "Facts for Industry" report covering the months of March, June, September and December.
[2] New series. Data for earlier months will be shown in a subsequent issue of this publication.
[3] Data cannot be published without disclosing operations of individual establishments.
[4] Not available; see "Facts for Industry," Series 6-1-1.
[5] Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.
[6] Not including quantities converted to finished dense soda ash.
[7] Natural soda ash, Glauber's salt, crude salt cake and sulfuric acid data collected in cooperation with the Bureau of Mines.
[8] Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. Consumption figures represent quantities of both liquid and solid caustic consumed in producing plants exclusive of quantities of liquid caustic evaporated to solid. Stocks figures include quantities on hand of liquid and solid material.
[9] Includes sulfuric acid of oleum grades.
[10] Excludes spent acid. For detailed explanation, see "Facts for Industry," Series 6-1-1.
* Revised.

Sulfur Production Down

Production and consumption of native sulfur decreased from the preceding month, but continued at a high level in November, 1944, according to figures released by the Bureau of Mines, United States Department of the Interior. Production was 53 per cent and sales were 31 per cent greater than in November, 1943. Industry stocks declined 20,773 long tons.

Production, mine shipments, apparent sales, and producers' stocks of native sulfur in the United States in selected periods, 1943-1944, in long tons:

Period	Production	Mine Shipments	Apparent Sales*	Producers' Stocks**
October, 1943	199,135	269,347	293,902	4,562,719
November, 1943	192,014	229,219	239,874	4,514,859
October, 1944	312,060	333,329	342,641	4,110,395
November, 1944	293,551	290,005	314,324	4,089,622

* Calculated from production and change in stocks during the period.
** Producers' stocks at mines, in transit, and in warehouses at end of period.

Commenting on sulfur production and consumption statistics for the past year, L. M. Williams, Jr., president of Freeport Sulfur Co., pointed out that the American sulphur industry, completing a year ot record-high shipments to war plants, faces the end of the war with few of the reconversion problems of other industries.

Sulphur uses are so widespread throughout industry and agriculture that sulphur producers will be able to rely on the same production methods they are now employing.

In the meantime, all wartime sulphur requirements continue to be met in full despite record demands. The high rate of industrial activity, in fact, made 1944 the top sulphur consuming year. Shipments from Gulf Coast mines reached a new all-time peak of approximately 3,500,000 long tons, compared with a previous peak of 3,401,410 tons in 1941.

Shipments exceeded sulphur production by about 350,000 tons. Production was estimated at 3,150,000 tons. Although mine stocks were reduced, they are still ample when coupled with large productive capacity to meet any anticipated emergency.

While sulphur supplies were more than adequate, the demand for sulphuric acid, the form in which most sulphur is used, was so heavy that allocations were placed in 11 Pacific Coast and Rocky Mountain states and then extended to the entire nation. To help alleviate the problem, construction of new productive facilities was started and when these new plants are ready for operation about the middle of 1945, acid capacity will rise to a new peak of over 9 million tons. Some acid requirements, chiefly those for the fertilizer program, were met by recovered acid from ordnance plants.

The fertilizer industry, one of the major consumers of sulphur, accounted for a large portion of 1944 consumption. Production of acid phosphate, the principal fertilizer, mounted to approximately 7 million tons, an all-time high for the 12 months ended last July. New facilities increased annual capacity by more than 600,000 tons.

Requirements for fertilizer are expected to continue heavy in the post-war period. Authorities believe that in the first two years after Germany's defeat Europe can supply a substantial share of its minimum food needs, but heavy fertilization will undoubtedly be necessary. As many of Europe's sulphuric acid plants have been destroyed or are obsolete, the fertilizer will no doubt have to be sent from the United States. Acid freed by munitions cutbacks will probably go into fertilizer production.

Three other industries which the impetus of the war has expanded phenomenally—synthetic rubber, high octane gasoline, and explosives—helped increase 1944 sulphur consumption to its new peak.

The synthetic rubber program came of age during the year, the new plants now reported operating at a substantial part of planned capacity. Sulphur in one or another form is used at several stages ot synthetic rubber manufacture. It also helps make the high test fuel for planes and virtually all the explosives for shells.

Such older sulphur consumers as paper, steel, rayon and petroleum refining continued to account for large portions of the annual consumption. Despite anticipated difficulties in the pulp and paper industry, due to shortage of pulp wood, consumption of sulphur by the industry was at a high level.

Exploration for Mercury

Summarizing the Bureau of Mines' exploratory program for mercury reserves in the United States and Alaska, Dr. R. R. Sayers, Bureau Director, announced

that ore sufficient to supply 5,000,000 pounds of this metal was marked out by field crews during the period 1940-44.

Counted by the mining industry in terms of flasks—76 pounds of mercury to the flask—the potential yield of the reserves in 66,600 flasks. Figured on a national production basis of 50,000 flasks per year, these reserves could meet all the needs of the Nation for 16 months, Dr. Sayers explained. Of the recently explored deposits, commercial-grade ore is sufficient to produce 37,400 flasks, or a 9 months' supply, and marginal reserves, 29,200 flasks, or a 7 months' supply.

A complete report just released on the Bureau's wartime drilling and trenching operations shows that the exploratory work was conducted in 15 states and Alaska. As of June 30, 1944, the Bureau had examined 190 deposits as follows: Alaska, 3; Arizona, 9; Arkansas, 31; California, 38; Colorado, 2; Idaho, 16; Michigan, 1; Nevada, 43; New Mexico, 1; Oregon, 27; South Dakota, 1; Texas, 11; Utah, 2; Washington, 3; and West Virginia and Wyoming, 1 each. Fifteen exploratory projects were started after these examinations and 13 have been completed, according to McHenry Mosier, author of the report, cited by Dr. Sayers.

Early in 1944, as Government stocks of mercury became adequate, domestic production gradually was curtailed. However, the Bureau has continued a small amount of exploratory work as a safeguard against any contingencies in the war.

Lead Stocks Low

The decrease in new supplies which failed to balance a high level of consumption was the outstanding feature of the lead industry in 1944. Although refinery production advanced slightly, producers' stocks and Government stocks of pig lead decreased in 1944, according to the Bureau of Mines, United States Department of the Interior. As a result of greater consumption, Government stocks of refined lead were called upon to make up the deficit and were thereby steadily reduced to a point considered to be below the margin of safety. By the end of the year a new revision of existing lead order M-38 was announced by the War Production Board to restrict consumption and ease a tight situation. The ceiling price of 6.50 cents a pound for common lead, New York, remained unchanged throughout 1944, and payments under the premium-price plan continued to be made by the Metals Reserve Company.

Production.—Reports from producers covering eleven months actual production plus an estimate for December indicate that 482,800 short tons of refined lead and 57,100 tons of antimonial lead were produced at primary refineries in 1944, an increase of 2 per cent, and decrease of 10 per cent, respectively, compared with refined and antimonial lead produced in 1943. Although data as to sources of the lead produced are not yet available it is estimated that 385,000 tons were from domestic ores and base bullion, an indicated decline of 4 per cent from 1943. A principal factor in the decline was the acute shortage of manpower, particularly at the mines. Final data for 1944 will undoubtedly show an increased production from foreign ores and base bullion.

For the first time since 1940, the percentage of antimony contained in antimonial lead produced showed an increase. The specific reasons for the increase are not yet apparent, but final data on consumption may well indicate that greater amounts of high percentage alloys were used in such items as storage batteries and babbitt metals for bearings.

Details of production of refined and antimonial lead in 1944 as compared with 1943 data have been published.

Stocks.—Producers' stocks of refined lead declined 46 per cent, according to reports submitted to the Bureau of Mines, whereas inventories of antimonial lead (in terms of lead content) advanced 25 per cent. The greatest drop, however, and the most serious—with respect to the over-all supply—was in Government-owned stocks which declined 48 per cent.

Consumption.—In 1944 the calculated supply of refined lead made available for shipment to consumers from primary refineries amounted to approximately 793,000 tons, a 2 per cent increase from the comparable figure of 779,524 tons in 1943. Changes in producers' stocks and Government-owned inventories are accounted for in the calculations. Depending on the change in consumers' stocks the calculated figure is a close measure of consumption for which actual figures for 1944 are not yet available.

Because of the critical situation which developed during the year as regards supply for an increased consumption, General Preference Order M-38 was amended by the War Production Board on December 26 in an effort to curtail consumption in 1945 and more closely balance the available supply. Under the new order consumption is not controlled by direct allocation to the consumer, but by restricted shipments from the producer on the basis of quotas allotted to intermediate product industry groups. Details of the order have been widely publicized and will not be repeated, but in general the result of this order will be a cut of approximately 40 per cent in civilian consumption based on the 1944 rate of use.

Price.—During 1944 there was no change in the ceiling price of 6.50 cents a pound for common lead, New York, and the premium payment program continued with no change.

Superphosphate: Production, Receipts, Disposition and Stocks, by Type, November 1944

In short tons (2000 pounds)

Item	*Normal 18% APA*	*Concentrated 45% APA*	*Wet-base goods 18% APA*
November, 1944			
Stocks on hand, beginning of month	797,312	28,055	8,520
Production	551,376	20,147	2,672
Received from other acidulators (inc. exchange transfers)	7,268	....	....
Book adjustments (account of inventory)	–99	–27	....
Total supply	1,355,857	48,175	11,192
Disposition, total	559,739	19,022	876
Shipments, total	313,222	18,811	370
Used in reporting plants	246,517	211	506
Stocks on hand, end of month	796,118	29,153	10,316
October, 1944			
Stocks on hand, beginning of month	783,274	31,808	7,465
Production	553,525	19,573	2,054
Received from other acidulators (inc. exchange transfers)	8,374	....	....
Book adjustments (account of inventory)	–409	+55	....
Total supply	1,344,764	51,436	9,519
Disposition, total	547,452	23,381	999
Shipments, total	317,249	23,262	651
Used in reporting plants	230,203	119	348
Stocks on hand, end of month	797,312	28,055	8,520
November, 1943			
Stocks on hand, beginning of month	762,093	45,290	12,546
Production	584,213	25,555	4,965
Received from other acidulators (inc. exchange transfers)	3,146	....	....
Book adjustments (account of inventory)	+2,653	–94	+75
Total supply	1,352,105	70,751	17,586
Disposition, total	600,042	25,152	3,736
Shipments, total	357,712	24,917	3,396
Used in reporting plants	242,330	235	340
Stocks on hand, end of month	752,063	45,599	13,850

Note: November 1944 statistics on superphosphate are based on the reports of 160 plants, of which 157 manufacture normal superphosphate, nine manufacture concentrated superphosphate, and seven manufacture wet-base goods. One plant, previously listed as producing wet-base goods, has not made this material during the past year. Three plants produce concentrated superphosphate exclusively, while 157 plants produce normal material only, or normal and concentrated or normal and wet-base goods. The statistics include data for all plants, including government owned, known to have facilities for superphosphate production. All quantities are expressed in equivalent short tons, the figures for normal superphosphate being shown on a basis of 18 per cent A.P.A. (available phosphoric acid), those for concentrated superphosphate on a basis of 45 per cent A.P.A., and those for wet-base goods on a basis of 18 per cent A.P.A. The statistics pertain only to superphosphate and include no data for dry-mixed or dry-base goods. Figures for receipts of material, shipments, consumption and stocks relate only to the plants actually producing superphosphate. Cases in which book figures differ from actual physical inventory are covered under the heading "Book adjustments," the amount of book excess being indicated by a minus sign (–) and the amount of book deficit by a plus sign (+). Since all quantities of each type of superphosphate are accounted for in each month's report, the stocks on hand at the beginning of the month, plus receipt of materials, plus or minus book adjustments, minus shipments and consumption, equal stocks on hand at the end of the month.

MARKET INTERPRETATION AND REVIEW

Postwar Alcohol and Rubber

The factors influencing the price and supply outlook for alcohol after the war are a complex jumble of economic laws, international agreements, and political pressure.

Grain alcohol is unable to compete economically with that obtained from blackstrap molasses or produced from refinery gases; but even as the farm bloc is attempting to force continuation of the synthetic rubber program regardless of the economics involved, so may it be expected to urge production of alcohol from high-priced grain.

But what of blackstrap molasses? Most of it has come from Cuba, where large quantities are obtained as a by-product of sugar refining. Before the war it was exported to this country for whatever price could be had, but now it is being converted to motor-fuel alcohol for domestic consumption. It is unlikely, but nevertheless possible, that an attractive domestic use might force the export price higher.

The postwar demand will depend a great deal on what is done with our synthetic rubber capacity. This, in turn, is subject to political winds, as was mentioned above, and also—probably to a greater extent—to international trade agreements.

The price of natural rubber has fluctuated wildly from 3¢ to $3 a pound. Since international stabilization a few years ago it has varied over a smaller range, averaging 16¢ per pound. Calculations show that synthetic GR-S can be produced for 15¢ or less, and on the surface it appears that the synthetic manufacturers stand a good chance to compete.

The fallacy here is that plant depreciation accounts for a greater proportion of the product cost than does the fixed capital depreciation of a natural rubber plantation. Implicit in the 15-cent figure is the necessity of operating at capacity; this is not true of natural rubber wherein labor is the major item. In the absence of a protective tariff, then, plantation owners can afford to cut the price of a length of time sufficient to drive synthetic competition out of business.

This takes us out of the province of natural economic checks and balances into the more arbitrary field of international trade agreements; and speculations will have to be modified in the light of our State Department's activities.

What About Toluene?

The munitions demand for toluene has resulted in a great expansion of facilities for making it from petroleum fractions. What will happen to this productive capacity after the war depends on interrelationships between the steel, liquid fuels, and synthetic rubber industries.

Toluene, in normal times, is obtained as a by-product of coking; the light-oil fraction of coal tar contains benzene, toluene, and xylenes. When large amounts of pure benzene are required, as for synthetic rubber, phenol, nylon, etc., a correspondingly greater amount of toluene is fractionated from the light oil. If relatively impure benzene for motor fuel is in demand, on the other hand, less toluene is separated from the oil fraction.

Cessation of the war is expected to lessen the demand for the aforementioned products which require pure benzene. The extent of coking operations, moreover, depends upon steel production, and this is expected to fall off considerably when military production is slackened.

There are no indications that any large new peacetime uses for toluene have been developed within the last few years. Unless new uses are found, or more and more is used to replace benzene, or steel production is maintained at a high level, much of our present capacity for petroleum conversion may find no outlet.

More Synthetic Vitamins

Niacin and ascorbic acid are being made available to feed mixers and veterinary medicine manufacturers for use in livestock feed and medicine upon application to the Agricultural Adjustment Agency, War Food Administration.

Because of the very short supply, these two vitamins have been denied to these manufacturers for some time. Eighteen thousand pounds of niacin and 2,400 lbs. of ascorbic acid will be allocated in 1945.

Stocks of low-potency vitamin A oil are ample, and its use is not restricted. The same is true of thiamin and riboflavin.

Turpentine, Linseed Oil Low

Several specialty lines of paints may have to be eliminated as a result of the recent linseed oil curtailment.

It is not feasible to reduce the oil content of present formulas, and it is only by cutting out such items as enamels, under-coats, and oil stains that the limited supply can be stretched to cover the more pressing needs. At the same time, the tie-up of raw material inventories for these specialized items can be avoided.

Manpower problems will restrict the production of gum turpentine and rosin in spite of the Government's efforts to increase last year's output by 35 per cent. Military requirements for marine and other paints, medicines, and flame-throwers are steadily rising.

Shipyards and other southern war industries have depleted the labor ranks of the lower-paying naval stores industry. Only by increasing the acreage or using more efficient methods can the 1945 goal of 350,000 barrels be reached, and all of these expedients are beset with practical difficulties. Production in 1944 was 240,000 bbls.—less than half of normal—and it may drop as low as 200,000 bbls. this year.

Transportation Tie-Up Causes Local Shortages

The extremely severe weather prevailing over a large part of the northeastern states caused serious dislocations in the industry during the past month. Not only were chemical deliveries hampered, but coal necessary to keep plants operating was hard to obtain.

The hard-hit Niagara Falls region ran short of sulfuric acid, limestone, and coke.

Two freight embargoes were enacted in order to give the railroads time to clear the congested area. Only critical materials were allowed to be shipped, but the shortage of empty cars retarded the movement even of those.

All of the shortages, of course, could not be assessed to rail difficulties; many were due to the generally prevailing situation in regard to raw materials. But the weather was a major factor whose effects will have a far-reaching effect on production schedules.

Crude Stocks Saved by Use of Synthetic Rubber

Increased use of synthetic rubber has lengthened the life of our crude rubber stockpile.

In the first quarter of 1943 twice as

much crude as synthetic was consumed, but the consumption ratio in the third quarter of 1944 was nearly four to one in favor of the synthetic—70,884 tons to 18,766 tons.

Nevertheless, the stocks of crude have shrunk to 98,000 tons, 42,000 tons below the comfortable minimum.

Other statistics released by the Rubber Manufacturers' Association revealed that rayon consumption for tires rose from 5.9 million to 19.5 million pounds in the first quarters of 1942 and 1944, respectively. The consumption of cotton for the same purpose only rose from 43.6 million to 45.2 million pounds.

Heavy Chemicals — The heavy chemicals market was upset by the transportation tie-up. The most seriously affected were caustic soda and soda ash, of which a critical shortage exists. Many others were in short supply, but it was a case of dislocation more than of genuine shortages. Among these were calcium chloride, ammonia, chrome chemicals, oxalic acid, and sodium phosphates. Chlorinated solvents, acetone substitutes, and potash chemicals were also exceedingly scarce.

The War Production Board announced that dry cell production would be 50 per cent higher in 1945 than last year; the sal ammoniac market is expected to reflect the increase in demand.

Fine Chemicals — Although the price of mercury has not advanced appreciably within the last few weeks, several derivatives advanced in keeping with the general upward trend of the metal. The iodide, for example, rose 8¢.

Scarcities due to the rail tie-up led to increases in the resale prices of *p*-dichlorobenzene and *m*-nitroaniline.

Military demand has kept the supply of sulfa drugs low—particularly of sulfathiazole. Ethanolamines are also scarce. Antimony and antimony chemicals were placed under allocation.

Specialty Chemicals— Manufacture of civilian paints and specialty coatings, as was mentioned above, were cut to the absolute minimum by the further restrictions on drying oils and the critical situation with regard to lead and other pigments.

A new grade of ammonium nitrate is being offered to fertilizer mixers. Containing more nitrogen, it saves on shipping space. The cost per ton, allowed by the OPA, is $1.70 more, but even so it is cheaper on a cost-of-nitrogen basis.

Paradichlorobenzene, used chiefly as a moth repellent, is in very short supply, and practically none was available on the spot market. It is likely that it will go under allocation if the situation worsens.

CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
Feb., '43, $0.910 Feb., '44, $0.890 Feb., '45, $0.874

	Current Market		1944 Low	1944 High	1943 Low	1943 High
Acetaldehyde, 99%, drs. wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv ....lb.	...	.07	...	.07	...	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. ....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. ....100 lbs.	6.93	7.25	6.93	7.25	...	6.93
Acetylsalicylic, Standard USP ....lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech, bbls. ....lb.	.43	.47	.39	.47	.39	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric, tech, bbls, c-l,....ton *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, crys, gran, bbls, lb. *b*	.20	.21	.20	.21	.20	.24
Cresylic 50%, 210-215° HB, drs, wks, frt equal gal.	.81	.83	.81	.83	.81	.83
Formic, Dom. cbys lcl ....lb.	.10½	.11½	.10½	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. ....lb.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs....lb.	.25	.26	.25	.26	.25	.26
Muriatic, 18° cbys ...100 lb.	1.50	1.75	1.50	1.75	1.50	2.45
20° cbys, c-l, wks ..100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric, 36°, cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks ....lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP ....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic, tech, bbls ....lb.	.26	.42	.26	.42	.26	.44
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks ....ton	...	16.50	...	16.50	...	16.50
Fuming (Oleum) 20% tks. wks ....ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls ......lb.	...	.70½	...	.70½	...	.70½
Alcohol, Amyl (from Pentane) tks, delv ....lb.	...	.131	...	.131	...	.141
Butyl, normal, syn, tks..lb.	...	.10¾	...	.10¾	.10¾	.14¾
Denatured, CD 14, c-l drs, ...gal. *d*	...	.57	...	.57	...	.54½
Denatured, SD, No.1, tks. *d*	...	.50	...	.50	...	.50
Ethyl, 190 proof tks...gal.	...	17.60	...	17.60	...	11.90
Isobutyl, ref'd, drs ....lb.	...	.086	...	.086	...	.086
Isopropyl ref'd, 91%, dms ....gal.	.39	.66½	.39	.66½	.39	.66½
Alum, ammonia, lump, bbls, wks ....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99% ..100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.08	.12	.08	.12
Hydrate, light ....lb.	.14½	.15	.14½	.15	.14½	.15
Sulfate, com'l. bgs, wks, c-l ....100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs. wks ....100 lb.	1.85	2.10	1.85	2.50	1.75	2.50
Ammonia anhyd, cyl ......lb.	...	.14½	...	.14½	...	.16
Ammonium Carbonate, lumps, dms ....lb.	.08½	.09¼	.08½	.09¼	.08¼	.09¼
Chloride, whi, bbls, wks, 100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks..lb.	.0435	.0850	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls..lb.	.27	.33	.27	.33	.27	.33
Perchlorate, kgs ....lb.	.55	.65	.55	.65	.55	.65
Phosphate, dibasic tech, bbls ....lb.	.07¼	.08½	.07¼	.08½	.07¼	.08½
Stearate, anhyd, dms ...lb.	...	.34	...	.34	...	.34
Sulfate, dms, bulk.....ton	28.20	29.20	28.20	29.20	28.20	30.00
Amyl Acetate (from pentane) c-l, drs, delv ....lb.	...	.15½	...	.18½	...	.18½
Aniline Oil, drs ....lb.	.11½	.12½	.11½	.12½	.11½	.12½
Anthraquinone, sub, bbls..lb.	...	.70	...	.70	...	.70
Antimony Oxide, bgs .....lb.	.15	.15½	.15	.15½	.15	.15½
Arsenic, whi, kgs—powd..lb.	.04	.04¾	.04	.04¾	.04	.04¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule, *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

	Current Market		1944 Low	1944 High	1943 Low	1943 High
Barium Carbonate precip, wks bgs. ....ton	60.00	75.00	55.00	75.00	55.00	65.00
Chloride, tech, cyst, bgs, zone 1 ....ton	73.00	78.00	73.00	90.00	77.00	90.00
Barytes, floated, bbls. ....ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines......ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys ....lb.	.22	.24	.22	.28	.22	.25
Beta-Naphthol, tech, bbls, wks ....ton	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots...lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks ....ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.	2.50	3.60	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs ....ton *i*	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs ...lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ....lb.	.21	.25	.21	.30	.25	.30
Butyl, acetate, norm drs, lb.	.1825	.1875	.1755	.1945	.1575	.1840
Cadmium Metal ....lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs. 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs ....ton	50.00	90.00	50.00	95.00	50.00	95.00
Carbonate, c-l bgs,....ton	18.00	22.00	18.00	25.00	18.00	22.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l, ton	18.00	31.50	18.00	31.50	18.00	31.50
Gluconate, U.S.P., drs. lb.	.57	.59	.57	.59	.57	.58
Phosphate, tri, bbls, cl ..lb.	...	.0635	.0635	.0785	.0635	.0785
Camphor, U.S.P., gran, powd, bbls ....lb.	.69	.71	.68½	.71	.68½	.70½
Carbon Bisulfide, 55-gal drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, cyl ....lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms ....lb.	.73	.80	.73	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more ....lb.	...	.22	...	.24	...	.24
Chlorine, cyls, lcl, wks, contract ....lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract ...lb. *j*	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 lb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs ....lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude ....bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt Acetate, bbl ....lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs ....lb.	...	1.84	...	1.84	...	1.84
Copper, metal....100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls.lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks crypt. ....100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks ..ton	...	14.00	..	14.00	...	14.00
Cresol, USP, drs ....lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Cyanamid, bgs ....ton	1.52½	1.62½	1.52½	1.62½	1.52½	1.62½
Dibutylamine, c-l, drs, wks lb.	...	.61	...	.61	...	.61
Dibutylphthalate, drs ....lb.	.2080	.2359	.1780	.2500	.2060	.2300
Diethylaniline, lb drs ....lb.	...	.40	...	.40	...	.40
Diethyleneglycol,drs,lcl.wks lb.	.14½	.15½	.14	.15½	.14	.15½
Dimethylaniline, dms.cl.,lcl lb.	.23	.24	.23	.24	.23	.24
Dimethyl phthalate, drs ..lb.	.1875	.1925	.1875	.1925	.1875	.2050
Dinitrobenzene, bbls ....lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls ....lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms ....lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks ....lb.	.16	.20	.16	.20	.15	.20
Diphenylamine bbls ....lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs ...lb.	...	.35	...	.35	.35	.37
Ethyl Acetate, tks, frt all'd lb.	.1070	.1175	.1070	.1175	.107	.110
Chloride, drs ....lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms ....lb.	...	.0891	...	.0891	...	.0842
Glycol, dms, cl. ....lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd. 95-98% bulk, cl-mines ....ton	...	37.00	...	37.00	...	37.00
Formaldehyde, c-l, bbls, kgs, wks ....lb.	.0520	.0570	.0520	.0570	.0550	.0575
Furfural tech, dms, c-l,wks lb.	...	.13	...	.13	...	.12½
Fusel Oil, refd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst,c.l.,bgs, bbls. wks ....100 lb.	1.05	1.25	1.05	1.25	1.05	1.25
Glycerin dynamite, dms, c-l, ...lb.	...	.14½	...	.14½	...	.18¾
Crude Saponification, 80% tks ....lbs.	...	.10	...	.11¼	...	.12¾

GUMS

Gum Arabic, amber sorts bgs ....lb.	.12½	.13	.11½	.14	.13½	.17½
Benzoin Sumatra, CS ....lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo ....lb.	...	.55¾	...	.55¾	...	.55¾
Copal, East India, chips ..lb.	...	.12	...	.12	...	.12
Macassar dust ....lb.	...	.07⅜	...	.07⅜	.07⅜	.11¾
Copal Manila,	.13½	.15½	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l lb.	...	.23⅜	...	.23⅜	...	.23⅜
Ester ....lb.	.11½	.12	.09½	.12	.09½	.12
Karaya, bbls, bxs, dms, ...lb.	.15	.46	.15	.46	.14	.40

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

v Price given is per gal.

	Current	Market	1944 Low	1944 High	1943 Low	1943 High
Kauri, N Y						
Superior Pale XXX ....lb.	...	.65¾	...	.65¾	...	.65¾
No. 3 ....lb.	...	.22	...	.23	...	.22
Sandarac, cs ....lb.	...	.99½	...	.99½	1.40	nom.
Tragacanth, No. 1, cases lb.	4.50	5.00	4.00	5.25	4.00	5.25
No. 3 ....lb.	2.75	3.00	1.10	3.50	1.10	1.20
Yacca, bgs ....lb.	...	.06	.06	.07¼	.06	.07¼
Hydrogen Peroxide, cbys ..lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars..lb.	2.00	2.10	2.00	2.10	2.00	2.10
Lead Acetate, cryst, bbls...lb.	...	.12½	...	.12½	...	.12½
Arsenate, bg, lcl ....lb.	.11½	.12	.11½	.12	.11½	.12
Nitrate, bbls ....lb.	...	.12½	...	.12½	...	.12½
Red, dry, 95% Pb_3O_4, lcl lb.	.09¾	.10¾	.09	.11	.09	.11
97% Pb_3O_4 bbls delv..lb.	.09½	.11	.09¼	.11	.09¼	.11
98% Pb_3O_4, bbls delv..lb.	.09½	.10¾	.09½	.11¼	.09½	.11¼
White, bbls ....lb.	.08¼	.08¾	.08¼	.08¾	.08¼	.08¾
Basic sulfate, bbls, lcl lb.	.07½	.08	.07¼	.08	.07¼	.08
Lime, Chem., wks, bulk..ton	6.25	13.00	6.25	13.00	6.25	13.00
Hydrated, f.o.b. wks ..ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv, bbls lb.	.08	.09¾	.08	.09¾	.08	.09¾
Lithopone, ordi., bgs......lb.	.04¼	.04½	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks lb.	.06¼	.09¾	.06¼	.09¾	.06¼	.09¾
Chloride flake, bbls, wks c-l ....ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls ....lb.	.15	.18	.15	.18	.14	nom.
Dioxide, Caucasian bgs, lcl ....ton	...	74.75	...	74.75	...	74.75
Methanol, pure, nat, drs gal *l*	.63	.76	.63	.76	.63	.76
Synth, drs cl.........gal. *m*	.31	.38	.31	.40½	.34½	.40½
Methyl Acetate, tech tks..lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl ....lb.	.32	.40	.32	.40	.31	.40
Ethyl Ketone,tks,frt all'd lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks ...gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks ....lb.	...	.0275	...	.0275	...	.0275
Nickel Salt, bbls, NY.....lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks ...lb.	.08	.09	.08	.09	.08	[illegible]
Orthonisidine, bbls ....lb.	...	.70	...	.70	...	[illegible]
Orthochlorophenol, drs ...lb.	.25	.27	.25	.32	...	.3[illegible]
Orthodichlorobenzene, drms lb.	.07	.08	.07	.08	.07	[illegible]
Orthonitrochlorobenzene, wks ....lb.	.15	.18	.15	.18	.15	.1[illegible]
Orthonitrotoluene, wks,dms lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl. ....lb.	...	.12	...	.12	...	.12
Chlorophenol, drs ......lb.	...	.32	...	.32	...	.32
Dichlorobenzene, wks ..lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks.lb.	.21	.22	.23	.24	.23	.24
Nitroaniline, wks, kgs..lb.	.43	.45	.43	.45	.43	.45
Nitrochlorobenzene, wks lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls lb.	...	.70	...	.70	...	.70
Toluidine, bls, wks ....lb.	...	.48	...	.48	...	.48
Penicillin, hospitals, institutions, ampules per 100,000 units	2.40	2.60	2.40	4.50	...	...
For gov. purchases, ampules per 100,000 units	...	.85	...	1.90	...	...
Pentaerythritol, tech...lb.	.29	.33	.29	.33	.29	.35½

PETROLEUM SOLVENTS AND DILUENTS

	Current	Market	1944 Low	1944 High	1943 Low	1943 High
Lacquer diluents, tks, East Coast ....gal.	...	11½	...	.11½	...	.11
Naphtha, V.M.P., East tks, wks ....gal.	...	.11	...	.11	...	.11
Rubber Solvents, East, tks, wks ....gal.	...	.11	...	.11	...	.11
Stoddard Solvents, East, tks, wks ....gal.	...	.10	...	.10	...	.09½
Phenol, U.S.P., drs.......lb.	.10½	.11¼	.10½	.11¼	.10½	.13¼
Phthalic Anhydride, cl and lcl, wks ....lb.	.13	.14	.13	.14	.13	.15½
Potash, Caustic, wks, sol lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
flake, 88-92% ....lb.	.07	.07½	.07	.07½	.07	.07½
liquid, tks ....lb.	...	.02¾	...	.02¾	...	.0275
dms, wks ....lb.	.03	.03½	.03	.03½	.03	.03½
Potassium Bichromate csks ....lb.	.09⅝	.10	.09⅝	.10	.09⅝	.10
Carbonate, hydrated 83-85% calc ....lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
Chlorate crys, bgs, wks lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs ....lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks ......lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans...lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, dom, 60-62-63% K_2O bulk unit-ton...ton	...	.53½	...	.53½	.53½	.56
Permanganate, USP, wks dms ....lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks....gal.	...	.03¾	...	.03¾	..	.03¾
Pyridine, ref., drms ......lb.	.45	.45½	.45	.46	.45½	.46
R Salt, 250 lb bbls, wks lb.	...	.65	...	.65	...	.65
Resorcinol, tech.,drms, wks lb	.68	.75	.68	.75	.68	.75
Rochelle Salt, cryst ......lb.	.43½	.47	.43½	.47	.43½	.47
Salt Cake, dom. blk wks .ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ½c higher.

	Current Market		1944 Low	1944 High	1943 Low	1943 High
Saltpetre, grn, bbls ...100 lb.	8.20	8.60	8.20	8.60	8.20	8.60
Shellac, Bone dry, bbls ..lb. ᵣ	.42½	.46	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bots ...oz.	...	.32⅜	...	.32⅜	...	.32⅜
Soda Ash, 58% dense, bgs, c-l, wks ....100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl....100 lb.	1.05	1.13	1.05	1.13	...	1.13
Caustic, 76% flake drms, cl ....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks ....100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms ....lb.	.08½	.10	.05	.10	.05	.06
Benzoate, USP dms ....lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works ....100 lb.	1.55	1.90	1.55	2.05	...	.
Bichromate,cks,wks l.c.l. lb.	.07½	.07¾	.07½	.07¾	...	.07¾
Bisulfite powd, bbls, wks ....100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls. wks .....100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, bgs, wks c.l. lb.	...	.06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks ....100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l ....lb.	...	2.50	...	2.50	...	2.50
Nitrate, imp, bgs... ton	...	33.00	...	33.00	...	33.00
Nitrite, 96-98% bbl. cl. lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di. anhyd. bgs. wks. ....100 lb.	6.00	7.25	6.00	7.25	6.00	7.25
Tri-bgs, cryst, wks 100 lb.	2.70	3.40	2.70	3.40	2.70	3.45
Prussiate, yel, bbls, wks lb.	...	.11	.10	.11	.10	.11
Silicate, 52°,drs. wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l 100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY ..lb.	.06½	.10	.06½	.12	.05	.12
Sulfate tech. Anhyd, bgs 100 lb.	1.70	1.90	1.70	1.90	1.70	1.90
Sulfide, cryst c-l, bbls, wks ....100 lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, wks .....lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs ....100 lb.	...	4.08	...	4.08	...	3.47
Potato, bgs, cl ....lb.	...	.0637	...	.0637	...	.0637
Rice, bgs ....lb.	no stocks		no stocks		.09½	.10¼
Sweet Potato, bgs ..100 lb.	.09	.09¼	.07½	.09¼	...	.07½
Sulfur, crude, mines ....ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs ....lb.	.18	.30	.18	.30	.18	.30
Roll, bbls...........100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl lb.	.07	.09	.07	.09	.07	.08
tks, wks ....lb.	...	.04	.04	.06	.04	.06
Talc, crude, c-l, NY .....ton	...	13.00	...	13.00	...	13.00
Ref'd, c-l, NY ......ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks ..lb.	no stocks		no stocks		no stocks	
Metal ....lb.	...	.52	...	.52	...	.52
Toluol, drs, wks ....gal.	...	.33	...	.34½	...	.33
tks, frt all'd ....gal.	...	.28	...	.28	...	.28
Tributyl Phosphate, dms lcl, frt all'd ....lb.	...	.47	...	.47	...	.47
Trichlorethylene, dms, wks lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate ....lb.	.24	.54½	.24	.54½	.24	.54½
Triethylene glycol, dms lcl lb.	.18½	.19½	.18½	.26	...	.26
Triphenyl Phos, bbls .....lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases ....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs ......lb.	no stocks		.25	nom.	.25	.26
Bees, bleached, cakes....lb.	...	.60	...	.60	...	.60
Candelilla, bgs crude... ton	.35	.44½	.34½	.48	.38	.48
Carnauba, No. 1, yellow, bgs, ton ....lb.	...	.83¼	...	.83¼	...	.83¼
Xylol, Indus. frt all'd, tks, wks ....gal.	...	.27	...	.27	...	.27
Zinc Chloride tech fused, wks ....lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks..lb.	.07¼	.07½	.07	.07½	.07	.07½
Sulfate, crys, bgs, ..100 lb.	3.40	4.15	3.40	4.35	3.60	4.35

Oils and Fats

	Current Market		1944 Low	1944 High	1943 Low	1943 High
Babassu, tks, futures ....lb.	...	.111	...	.111	...	.111
Castor, No. 3, bbls ......lb.	.13¾	.14⅛	.13¾	.14⅛	.13¾	.14⅛
China Wood, drs, spot NY lb.	.39	.40	.39	.40	...	.39
Coconut, edible, drs NY ..lb.	...	.0985	...	.0985	...	.0985
Cod Newfoundland, dms..gal.	.85	.88	.85	.90	...	.90
Corn, crude, tks, wks ....lb.	...	.12¾	...	.12¾	...	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.1510	.1510	.1560	...	.1530
Menhaden, tks ....gal.	...	.0890	...	.1225	...	.1225
Light pressed, drs l.c.l. lb.	...	.1300	...	.1200	.1305	.1307
Oiticica, liquid, tks ......lb.	...	.21	.18½	.25	...	.25
Oleo, No. 1 bbls, NY ....lb.	.13¼	nom.	.13¾	nom.	.13¾	nom.
Palm, Niger, dms ....lb.	...	.0865	...	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks ....lb.	...	.13	...	.13	...	.18
Perilla, crude dms, NY...lb.	no stocks		...	.245	...	.245
Rapeseed, New Orleans, bulk ....lb.	...	.1156½	...	.1156½	...	.1150
Red, dms ....lb.	.12¾	.13¾	.12¾	.14¾	.13¼	.14¼
Soy Bean, crude, tks, wks lb.	...	.1175	...	.1175	...	.1175
Tallow, acidless, bbls ....lb.	...	.14¼	...	.14¼	...	.14¼
Turkey Red, single, drs ..lb.	.9½	.11	.9½	.14½	.10	.14½

ᵣ Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c: Philadelphia deliveries f.o.b. N. Y., refined 6c higher in each case

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1—Bird 48″ Stainless Steel Extractor
1—Copper Ag. & Jack. Vac. Pan 500 Gals.
1—Copper Ag. & Jack. Kettle 500 Gals.
1—Closed Copper Jack. Kettle 1000 Gals.
2—Buffalo Jack. Crystallizers 6′
1—Oliver 8′ x 8′ Rotary Filter
1—Buffalo 24″ x 20″ Vac. Drum Dryer
1—Devine 48″ x 40″ Vac. Drum Dryer
1—Cast Steel Autoclave 3′-6″ x 5′ direct fired with agitator.
1—Colton #3 Rotary Tablet Machine 1″
2—Shriver 24″ Washing Type Filter Press
1—W. & P. JACK. MIXER 20 GALS. 10 HP MOTOR

Send us your inquiries and lists of Surplus. Ask for Bulletin "X".

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1—60 gal. Copper Vacuum Still.
2—(New) 24 x 48″ Vibrating Screens.
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2—#600 De Laval Clarifiers.
8—Elmes 4″ ram Hydraulic Presses.
1—3-stage 75 hp. Centrifugal Pump.
2—4 x 6′ Atmospheric Drum Dryers.
4—Lead-lined Tanks, 400 and 1000-gal.
2—Triangle Fillers, Gluers, Sealers.
1—5 x 4′ Oliver wood drum Filter.
6—(New) 36″ Stoneware Vacuum Filters.
1—4′ Copper Vacuum Pan.
4—Water Stills: 10, 25, 100, 175 GPH.
4—Colloid Mills: 1, and 40 hp.
1—10 gal. Buflovac jac. Autoclave.
What equipment have you for sale?

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Machinery for Sale

1—Monel Metal Cyclone Tank
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5—Cast Iron Receivers
1—36″ diameter Galvanized Evaporator
1—Dorr Filter, Type BM-8′ diameter x 12′ long. Rotating Continuous Operation.
2—Patterson Jacketed Mixers, 4′ x 4′6″ x 20′ long.
2—Jacketed Steel Tanks, 4′ x 8′.
1—Horizontal Jacketed Mixer, 7′ diameter x 10′ long.
1—Stokes 3′ x 3′ x 8′ Jacketed Mixer.
2—Jewel 250 G.P.H. Water Stills.
Also:—Cast Iron Filter Presses—Pumps—Air and Ammonia Compressors — Dough Mixers—New Stainless Steel Tanks.

Write For Latest Stock List

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7—New Pressure Tanks built for 600# W. P. Inside dimensions 30″ dia. x 7′1″. 27/32″ shell. Bottom head ¾″. Top head 19/32″. With 12 x 16″ Top Manhole. Weight approx. 3000 lbs. each. Immediate shipment. Special price.

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1—Battery of 5—40″ steel basket, Western States 1600 RPM, belt driven CENTRIFUGALS, ball bearing, water-cooled heads; mixer with Stevens mingler coil, syrup troughs, all supporting framework, unloaders.
1—19,000 sq. ft., quadruple effect, horizontal, brass tube EVAPORATOR, with all piping, pumps, etc.
3—8 x 10 Wood Stave OLIVER FILTERS, complete with all pumps and accessories.
7—JUICE HEATERS 500 to 750 sq. ft. H. S.
MISCELLANEOUS: Pumps, Packaging Machinery, Coil and Calandria Pans.

PARTIAL LIST OF STOCK AT NEWARK SHOPS

2—Bufflovak 6′ dia. Jack. Vacuum CRYSTALLIZERS or VACUUM PAN DRYERS.
8—DRY POWDER MIXERS various sizes, to 3000 lbs.
2—W. & P. MIXERS sizes 21-X-BB, jacketed, 625 Gal.
5—RAYMOND PULVERIZERS; 4-Roll Low Side; No. 3 No. 1, No. 0000.
1—4′ x 6′ OLIVER CONTINUOUS FILTER; 2—8′ x 8′.
1—Day No. 30 Imperial Jack. MIXER, 75 Gal.
29—CENTRIFUGAL EXTRACTORS, 12″ to 72″ bronze and steel baskets, belt and motor drives.
2—8′ x 30″ Hardinge Conical Silex Lined PEBBLE MILLS, also 6′ x 36″.
5—ROTARY KILNS, 6′ x 60′, 8′ x 125′, 8′ x 135′.
10—Dopp C. I. jacketed KETTLES, 25 Gal. to 100 Gal.; 30-steel, cast iron, jack. up to 2000 gals.
3—ROLLER MILLS 6′6″ x 14″, 12 x 30, 16 x 40, water cooled.
1—Pneumatic Scale Co. Auto. 6 head CAPPER & CAP FEEDER, M.D.
3—40 Gal. DAY PONY MIXERS.
1—450 Gal. GLASS LINED jack., agit. KETTLE; 2—150 Gal. Jack. Agit.; 2—200 Gal. Jack.
1—Filler Machine Co. 8-spout piston FILLER
1—WORLD High Speed straightaway LABELER.

2—4-Roll RAYMOND HIGH SIDE MILLS, equipped for vacuum air separation—one with latest "whizzer" separator, with double cone vacuum separator. Each including exhauster, cyclone collector and inter-connecting piping.

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1—Buffalo 48 x 40″ VACUUM DRUM DRYER, with bronze chromium plated drum, Vacuum pump. Barometric condenser, Vacuum receiver, etc.
All items motor driven, still set up in operating condition.

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PATENTS

Gilchrist Heads Campaign

Huntington Gilchrist, former member of the International Secretriat of the League of Nations at Geneva, Switzerland, and presently an executive of American Cyanamid Company, has accepted the general chairmanship of a nation-wide campaign to arouse the public's full understanding of the Dumbarton Oaks Proposals.

The campaign is being sponsored by the American Association for the United Nations, Inc., and its research affiliate, the Commission to Study the Organization of Peace, whose national headquarters are at 8 West 40th Street, New York City.

Hughes Returns to Phillips

J. E. Hughes, for the past two years associated with Max B. Miller in the Construction Division of the Petroleum Administration for War, has returned to Phillips Petroleum Co. While with PAW he served as Chief of the pressure vessel section, being primarily concerned with the scheduling of raw and fabricated material and equipment to the major 100 Octane projects. Prior to joining PAW in June, 1942, Mr. Hughes had been in the Engineering and Construction Department of Phillips.

Squibb Promotes Toohy, Weicker and Hardt

John J. Toohy has been elected vice-president in charge of sales administration for E. R. Squibb & Sons. Theodore Weicker, Jr., has been made vice-president in charge of Inter-American operations while Robert A. Hardt has been named vice-president in charge of advertising and sales promotion.

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"WE"-EDITORIALLY SPEAKING

ONE WAR-BORN agency which will serve industry well in the future is the National Roster of Scientific and Specialized Personnel. The skills of over 400,000 registrants are listed on punched cards, so that if you want, say, a chemical engineer who is an expert on heat-transfer media, who reads Arabic and has traveled in Guatemala, a series of intricate machines will find those who are qualified.

Roster officials are also preparing vocational monographs designed to help students and to counsel returning veterans. Two of them—one on chemistry and one on chemical engineering—are almost completed.

THE OLD ADAGE "One man's meat is another man's poison," seems to have been proved again. We knew that copper sulfate was used to kill vegetable growths in lakes, reservoirs, and the like, but we didn't know that the addition of copper sulfate to fertilizer increased crop yields by 33 per cent. When is a vegetable not a vegetable?

HERE IS MORE fuel for the fiery debate on the question: Do we have enough petroleum? William R. Boyd, Jr., head of the Petroleum Industry War Council, recently said: "New discoveries and careful management of existing fields will be needed as a result of the war. A realization of . . . great responsibilities may determine the destiny of the next generation of our nation and our people."

BACK IN SCHOOL we learned that selenium was good for making ruby glass and that the odor of its organic compounds was not delightful. Beyond that it was merely a curiosity. Now it has been found that its compounds improve lubricating oils, make free-machining alloys, and find use in radio and electronic equipment, toning photographic prints, and barnacle-proofing ship hulls. A veritable genie from Aladdin's Lamp.

ONE OF OUR synthetic rubber plants, with 734 employees, has turned out as much rubber as 45,000 native workers, tapping 16,000,000 trees, could produce in the same time. Projecting this to the scale of our total annual production, almost half a million natives, each with a bucket, would have to work pretty hard. Sweet are the uses of technology!

Fifteen Years Ago

From Our Files of March, 1930

United States leads the world in the production of coal tar, the present output approximating 2,500,000 metric tons a year, according to the chemical division of the Department of Commerce. An examination of the data available indicates that Germany and the United Kingdom are the leading European producers.

Canadian Industries, Ltd., is making good progress with the construction of its new plant for the manufacture of sulfuric acid at Copper Cliff, in the Sudbury district of Northern Ontario. Its capacity will be approximately 150 tons of sulfuric acid per day.

Russia's co-ordinating chemical council of the Supreme Industrial Council of the U.S.S.R. has decided to undertake the manufacture in Russia of acetone and butyl alcohol by the fermentation process.

American Cyanamid Co. purchases controlling interest in Chemical Construction Co., Charlotte, N. C., and acquires Lederle Antitoxin Laboratories, New York; Passaic Color Co., Passaic, N. J., and Garfield Aniline Works, Garfield, N. J.

Dr. Samuel E. Sheppard, assistant director, research department, Eastman Kodak Co., is awarded William H. Nichols medal, New York section, American Chemical Society for 1930. Presentation will be made March 14 at joint meeting of American Chemical Society, Society of Chemical Industry, Societe de Chimie Industrielle, and the American Electrochemical Society, in the Chemists' Club, New York.

Dr. Irving Langmuir, associate director, research laboratory, General Electric Co., is chosen to receive the Willard Gibbs Medal of the Chicago section, American Chemical Society for 1930.

Naugatuck Chemical Co. and Rubber Regeneration Co., U. S. Rubber subsidiaries, are combined into a single operating unit. Elmer Roberts, general manager, Naugatuck Chemical Co., will be manager of the combined plants which will be known as the chemical and reclaiming departments.

Tennessee Eastman Corp. begins production of cellulose acetate in first unit of plant at Kingsport, Tenn. Capacity production will be reached by mid-summer.

NOW THAT the checked-suit sharpers are no longer extracting two-dollar bills from the willing pockets of race followers, the Government recognizes the fact that horse-racing is no longer a cost-of-living item. That's what we gather, at least, from the fact that OPA has removed price ceilings on aluminum horseshoes.

SILICON gets into the news again. Tetracresyl silicate has been found to be a superior heat-transfer medium, and post-war planners are already envisioning the use of the stuff in radiators, electric irons, toasters, and practically everything else in the kitchen. We were amused, though, to read that it can be heated to 800 degrees, or *twice* as hot as a 400-degree oven. Maybe we're sticking our neck out, but we claim that it is only 1.465 times as hot.

THE TERM "a house of cards" may no longer be merely a literary metaphor. We read that a waterproof, weather-proof paper house can be prefabricated for $100 —and that includes paper rugs, curtains, window shades, cups and dishes as well as a stove. We suppose that after a windstorm, you simply climb up on the roof and replace the shingles with old copies of the *Saturday Evening Post*.

BUCK ROGERS is apparently on the Government payroll. That's what we gather, at least, from the report that the boll weevil is being fought with a "death ray." The insect collapses in a high fever and the cotton plant is uninjured.

THE LIST of substances that man has used to keep his hair slicked down runs, no doubt, into the hundreds. It took our soldiers, though, to discover that dimethyl phthalate not only keeps away the bugs, but also gives the hair that well-groomed appearance that native girls (*i. e.*, natives of *any* country) love.

PART 2: PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 569, No. 4; Vol. 570, Nos. 1-3 (Dec. 26-Jan. 16)—p. 555

* *Explosives*

Initiating explosive for priming secondary explosives used as base charges for firing devices comprising an admixture of lead azide and a comminuted flame producing material selected from black powder and smokeless powder. No. 2,363,863. Edward Hanley to Hercules Powder Co.

Method of filling explosive devices. No. 2,364,415. Theodore Arnold and Curzon Dobell to The Preload Corp.

Gelatin type explosive composition which includes nitroglycerin and a cellular, carbonaceous material selected from cork, balsa, bagasse, bongo wood and hemp hurds treated with synthetic resin heat-hardened in situ. No. 2,365,170. Charles Bitting and Robert Lawrence to Hercules Powder Co.

* *Foods*

Stabilizing shortening which comprises adding a tocopherol-containing deodorizer sludge to a shortening and hydrogenating resultant mixture. No. 2,363,672. Jakob Jakobsen to General Mills, Inc.

Producing food material from a protein and whey, which comprises hydrolyzing protein with liquid having solids of sour milk whey. No. 2,363,730. Lloyd Hall to Nicholas Simmons.

Making a nutrient material for oral, rectal, and parenteral administration, which consists in subjecting protein material to digestion with papain. No. 2,364,008. Elmer Stuart to Eli Lilly & Co.

Preserving vegetable food by freezing. No. 2,364,049. Duryea Bensel to Bensel-Brice Corp.

Vitaminizing fermented malt beverages. No. 2,364,060. Marvin Ditto and William Torrington to Emulsions Process Corp.

Boiled viscous liquid dipping coating base for frozen confectionery products which is devoid of free fats composed of food containing starch, sugar, malt powder, dried skimmed milk powder, and water. No. 2,364,592. Norman M. Thomas and Norman H. Thomas to Joe Lowe Corp.

Cellulose wax gel for use as adherescent protective coat for fresh food bodies. No. 2,364,614. Joseph Harold Beatty.

Preparing an emulsion for application to fruit and vegetables to enhance luster and control shrinkage and decay which consists in melting candelilla wax and fatty acids and adding aqueous solution of a saponifying agent. No. 2,364,632. James Handy to Duzzel Corp.

In preparation of fresh fruit for market, providing it with a thin waxy coating to enhance its marketability. No. 2,364,946. Lloyd Burwick and Charles Cothran and Thomas Cunning to Brogdex Co.

Processing of sour cream. No. 2,365,217. Charles Rogers.

Mineral supplement to supply calcium and phosphorus to diet, comprising a mixture of monocalcium orthophosphate and dicalcium phosphate dihydrate, including a molecularly dehydrated alkali metal phosphate as anti-caking agent. No. 2,365,438. Theodore Schilb to Monsanto Chemical Co.

Bread improver comprising sodium, potassium, ammonium and calcium chlorites dispersed in edible carrier which is inert to the chlorite. No. 2,365,534. Charles Ferrari to The Mathieson Alkali Works, Inc.

* *Fine Chemicals*

Esters of unsaturated acids. No. 2,363,501. Gerald Coleman and Wesley Schroeder to The Dow Chemical Co.

Isomerization and dismutation of a 3,21-dihydroxy-26-keto compound having a cyclopentanopolyhydrophenanthrene nucleus with a metal alcoholate in presence of an inert solvent. No. 2,363,548. Rupert Oppenauer.

Cyclohexyl-amine salts. No. 2,363,561. Frank Smith and John Hansen to The Dow Chemical Co.

Aminoalkyl sulphide-aldehyde reaction product. No. 2,363,607. Roger Mathes and Paul Jones to The B. F. Goodrich Co.

Stabilization of organic substances containing catalyst of group consisting of manganese, iron, cobalt, copper and their compounds, and having incorporated a metal deactivator sufficient to deactivate said catalyst. No. 2,363,777. Frederick Downing and Charles Pedersen to E. I. du Pont de Nemours & Co.

Stabilization of organic substances containing a catalyst of group consisting of manganese, copper and their compounds, and having incorporated a metal deactivator sufficient to deactivate said catalyst. No. 2,363,778. Charles Pedersen to E. I. du Pont de Nemours & Co.

2-amino-4'-hydroxy diphenyl. No. 2,363,819. William von Glahn and Bernard Rottschaefer to General Aniline & Film Corp.

1-(3'-chloro-2'-hydroxy propyl)-amino-5-hydroxy naphthalene-7-sulphonic acid. No. 2,364,033. David Woodward to E. I. du Pont de Nemours & Co.

Indenyl isophorone, when pure consisting of colorless crystals melting at 90°-91° C. No. 2,364,056. Herman Bruson to The Resinous Products & Chemical Co.

Carbonamidine derivatives. No. 2,364,074. Madison Hunt and James Kirby to E. I. du Pont de Nemours & Co.

Preparing N-(beta-aminoalkyl) amines which comprises reacting a beta-aminoalkyl hydrogen sulfate with ammonia, primary amines or secondary amines. No. 2,364,178. Alexander Wilson to Carbide & Carbon Chemicals Corp.

Preparation of diamidino-stilbenes. No. 2,364,200. Arthur Ewins and Julius Nicholson Ashley to May & Baker Ltd.

Alpha-pyrone carboxylic acid amides and their manufacture. No. 2,364,304. Henry Martin, Walter Baumann and Hans Gysin to J. R. Geigy A. G.

Nitrogen heterocyclic compounds. No. 2,364,347. Joseph Dickey and Robert Corbitt to Eastman Kodak Co.

Surface-active agents phosphinic acids of ketones. No. 2,364,348. Joseph Dickey to Eastman Kodak Co.

Ester-lactones. No. 2,364,358. Rudolph Hasche and Jack Gordon to Eastman Kodak Co.

Making 2-mercapto-thiazoline which comprises heating mixture of ethanol amine and carbon disulfide. No. 2,364,398. Halsey Stevenson to E. I. du Pont de Nemours & Co.

Preparing 2-mercapto-thiazoline which comprises reacting ethanol amine with carbon disulfide. No. 2,364,399. Ira Williams, Bernard Sturgis, and John Verbanc to E. I. du Pont de Nemours & Co.

Preparation of an acetal which comprises heating an aldehyde and an alcohol with a hydroxy-substituted organic compound. No. 2,364,455. Donald Loder, William Gresham and Donald Killian to E. I. du Pont de Nemours & Co.

Fusing alpha-tetranthrimide or alpha-pentanthrimide with aluminum chloride to produce corresponding anthrimide-carbazole. No. 2,364,456. Ralph Lulek to E. I. du Pont de Nemours & Co.

Producing beta-aminopropionic acid which comprises heating ethylene cyanohydrin with aqueous ammonia. No. 2,364,538. Philip Kirk and Joseph Paden to American Cyanamid Co.

Preparing N,N'-diarylamidines which comprises mixing a primary aromatic amine, a carboxylic acyl dicyandiamide and an acid. No. 2,364,593. Jack Thurston and Daniel Nagy to American Cyanamid Co.

Preparation of acid salts of guanylthiourea. No. 2,364,594. Jack Thurston and Russell Sperry to American Cyanamid Co.

Removing color-imparting elements from water-soluble lanthanum salts. No. 2,364,613. Albert Ballard and Lawrence Martinson to Eastman Kodak Co.

Ethers. No. 2,364,737. Frank McGrew to E. I. du Pont de Nemours & Co.

N-allylnormorphine and processes for its production. No. 2,364,833. John Weijlard and Arthur Erickson to Merck & Co. Inc.

Manufacture of unsaturated 17-hydroxy-17-acyl-androstanones and their derivatives. No. 2,365,292. Leopold Ruzicka to Ciba Pharmaceutical Products, Inc.

Synthesizing beta-alanine which comprises catalytically hydrogenating a lower alkyl ester of cyanoacetic acid in presence of sulfuric and acetic acids. No. 2,365,295. Kurt Schaaf and Frank Pickel to National Oil Products Co.

Alpha,beta-unsaturated alkenephosphonic acid dichloride. No. 2,365,466. Lyle Armstrong Hamilton to E. I. du Pont de Nemours & Co.

Purifying crude p-phenetidine, obtained by catalytic hydrogenation of para-nitro-phenetole. No. 2,365,493. Clarence Richardson, Jr. to E. I. du Pont de Nemours & Co.

Production of a 1:2-dihydropyran which comprises subjecting tetrahydrofurfuryl alcohol in vapour phase to action of a catalyst consisting of mixture of alumina and aluminum phosphate. No. 2,365,623. John Bremner and Donald McNeil to Imperial Chemical Industries Ltd.

* *Industrial Chemicals, Inorganic*

Preparing magnesium silicate adsorbent compositions for use in percolation decolorizing methods. No. 2,364,015. Charles Winding to Tide Water Associated Oil Co.

In manufacture of sulphuric acid by contact process in which moisture laden gas utilized in production of sulphur trioxide is dried, the steps of drying said gas by contact with extra-process lead-containing sulphuric acid of drying strength. No. 2,364,213. Carl Herrmann to E. I. du Pont de Nemours & Co.

Manufacture of catalysts for production of hydrogen by reaction of carbon monoxide and steam and comprising iron oxide and containing chromium and alkali metal compounds. No. 2,364,562. Vernon Stowe to The Solvay Process Co.

Estimating quantity of free ammonia contained in mixed gas leaving a nitriding furnace. No. 2,364,789. Frederick Haywood, one-half to Wild-Barfield Electric Furnaces Ltd.

Conditioning of individual filter leaves of a vacuum filter employed for clarification of cyanide solution. No. 2,364,867. Louis Mills and Thomas Crowe and Raymond Byler to The Merrill Co.

Purifying aqueous alkali metal hydroxide which comprises nickel salt solution, stagnating mixture, and then separating all insolubles from said hydroxide. No. 2,364,882. Gardner Vose to Diamond Alkali Co.

Producing metal catalysts which comprise reacting supporting base containing metal of nickel, cobalt, silver, or palladium, with solution of acid of phosphorus to form a layer of phosphorus-containing salt of metal on base and eliminating acid radical from salt to produce a catalytically active layer. No. 2,364,970. Marion Gwynn.

Forming a filter pack of granular particles provided with outside surfaces of a slowly soluble silicate compound, placing pack in contact with a swelling agent and hardening silicate material. No. 2,365,033. Milton Williams to Standard Oil Development Co.

Selectively plugging off flow of fluid through non-productive more permeable porous rigid sand formations exposed to oil well, comprising preparing solution of sodium silicate together with a bircarbonate salt. No. 2,365,039. Kurt Andresen to Case, Pomeroy & Co.

Froth flotation process of separating acidic silicious gangue from nonmetallic ore values. No. 2,365,084. David Jayne, Jr., Harold Day, and Elmer Gieseke, to American Cyanamid Co.

Active nickel catalyst prepared by heating a nickel salt of an organic acid in a mixture of white mineral oil and a fatty oil. No. 2,365,125. Hans Vahlteich and Ralph Neal to The Best Foods, Inc.

* Continued from last month (*Vol. 568, No. 4, Vol. 569, Nos. 1-3*).

Making ferric hydrate by atmospheric corrosion of moist finely divided metallic iron, ferric hydrate material useful for removal of hydrogen sulfide from fluid media, comprising maintaining in said moisture material selected from ferrous ammonium sulfate and mixture of ferrous sulfate and a sulfate of an organic amine base. No. 2,365,202. William Marek to Connelly Iron Sponge & Governor Co.

Apparatus for electrolytically producing oxygen and hydrogen. No. 2,365,330. Asa Carmichael.

Preparing sodium cyanide by reacting anhydrous hydrocyanic acid with caustic soda in solid crystal form in presence of caustic soda in aqueous solution. No. 2,365,417. David Kusman.

* *Industrial Chemicals, Organic*

Recovering glycerin from fermentation slops, which comprises mixing therewith a volatile solvent for glycerin at least partly miscible with water and possessing low solubility for solid material present. No. 2,363,494. George Batchelder and Ralph Peterson to E. I. du Pont de Nemours & Co.

Separating alpha-actylenes from hydrocarbon mixtures containing same in admixture with conjugated diolefines. No. 2,363,527. Lee Horsley and Howard Nutting to The Dow Chemical Co.

Fractionation of hydrate-forming hydrocarbons. No. 2,363,529. Arthur Hutchinson to The Fluor Corp. Ltd.

Purifying methyl styrene contained in mixture including methyl phenyl acetylene. No. 2,363,676. Claude Jordan to The United Gas Improvement Co.

Partial hydrogenation of water-soluble salts of polyolefinic fatty acids which comprises treating solution of salt of polyolefinic fatty acids in water with hydrogen in presence of nickel hydrogenation catalyst. No. 2,363,694. John Ross and Joseph Turck to Colgate-Palmolive-Peet Co.

Producing combustible gas by partial combustion of a solid fuel of low B.t.u. content. No. 2,363,708. Kenneth Urquhart.

Production of hydrocarbons with more than one carbon atom in molecule by catalytic conversion of carbon monoxide with hydrogen. No. 2,363,739. Glaus Meisenheimer and Arno Scheuermann.

Manufacture of para-xylene. No. 2,363,768. Earl Zetterholm to Universal Oil Products Co.

Effecting separation of isomeric close-boiling aliphatic C_4 to C_7 olefins of different carbon-skeletal structure from one another. No. 2,363,782. Frederick Frey to Phillips Petroleum Co.

Catalytic dehydrogenation of paraffins and olefins by contacting under dehydrogenating conditions of temperature and pressure with a difficultly reducible metal oxide catalyst which when fresh is capable of effecting both isomerization of olefins and dehydrogenation of paraffins and olefins. No. 2,363,824. I. Louis Wolk to Phillips Petroleum Co.

Isomerizing normally gaseous hydrocarbons which comprises contacting said hydrocarbons with a catalyst prepared by impregnating silica gel with a solution of $AlCl_3$ No. 2,363,858. Stewart Fulton and Thomas Cross, Jr. to Standard Oil Development Co.

Making gelatin derivatives which comprises reacting together gelatin and a lower fatty acid with heating. No. 2,363,892. Jean Baptiste Monier.

Separation of tall oil into components. No. 2,363,925. Frederick Adams to Pittsburgh Plate Glass Co.

Preparing ethyl benzene which comprises passing benzene and ethylene in vapor state through a liquid mass including aluminum chloride and diethyl benzene. No. 2,364,203. Alfred Francis and Ebenezer Reid to Socony-Vacuum Oil Co. Inc.

Separating mixture containing acetone, methanol, ethanol, and water. No. 2,364,341. Albert Bright and Webster Fisher to Eastman Kodak Co.

Butadiene. No. 2,364,377. Allen Lawrence to E. I. du Pont de Nemours & Co.

Depolymerizing into polymer-forming units, a solid synthetic linear polymer taken from synthetic linear polyamides and polyesters, and polymerizing, by removal of water. No. 2,364,387. Wesley Peterson to E. I. du Pont de Nemours & Co.

Production of mixtures containing sulphur nitride by reacting ammonia with one or more chlorides of sulphur dissolved in organic liquid. No. 2,364,414. Michael Arnold and William Perry to Imperial Chemical Industries Ltd.

Separating pure thiophenols from "acid oils" containing same which are free of alkyl mercaptans. No. 2,364,416. George Ayers, Jr. and Meyer Agruss and Richmond Bell to The Pure Oil Co.

Production of alkenoic nitrile of at least 5 carbon atoms. No. 2,364,422. Benjamin Brooks to Standard Alcohol Co.

Preparing an alkyl ester which comprises reacting a cyclic formal with carbon monoxide in presence of acidic catalyst and esterifying product. No. 2,364,438. William Gresham to E. I. du Pont de Nemours & Co.

Aromatizing paraffinic naphtha. No. 2,364,453. Edwin Layng and Vanderveer Voorhees, one-half to Standard Oil Co., and one-half to The M. W. Kellogg Co.

Coking tar. No. 2,364,492. Malcolm Tuttle to Max B. Miller & Co. Inc.

Halobutene containing halogen atom linked to unsaturated carbon atom and a stabilizing quantity of a lime slurry. No. 2,364,587. Rupert Morris and Edward Shokal to Shell Development Co.

A halobutene containing halogen atom linked to unsaturated carbon atom and stabilizing amount of an epoxide compound. No. 2,364,588. Rupert Morris and Edward Shokal to Shell Development Co.

Producing citric acid, which comprises fermenting a sucrose medium containing an organic nitrogen-containing compound and a potassium salt of an organic acid with Aspergillus niger. No. 2,364,701. William Eisenman and Max Blumenfeld to Heyden Chemical Corp.

Subjecting mixture of a phenol free of unsaturated hydrocarbon substituents and of class consisting of hydroxybenzene, naphthol, anthranol, etc., with an alkyl ether of a phenol having unsaturated hydrocarbon substituent to a condensing reaction in presence of katenoid condensing agent. No. 2,364,712. Mortimer Harvey to Harvel Research Corp.

Partially hydrogenated hydrocarbon liquid mixture, having specific gravity within 1.05 to 0.970 and formed in synthesis of biphenyl by pyrolysis of benzene. No. 2,364,719. Russell Jenkins to Monsanto Chemical Co.

Producing alkylated aromatics by subjecting an alkylating agent, consisting of an alkyl halide, and an aromatic hydrocarbon to reaction under alkylating conditions and in presence of catalyst consisting of metal oxide. No. 2,364,762. Louis Schmerling and Arthur Durinski to Universal Oil Products Co.

Producing difluoroalkanes comprising mixing a monochloroolefin with anhydrous hydrogen fluoride. No. 2,364,818. Mary Renoll to Monsanto Chemical Co.

* Continued from last month (*Vol. 568, No. 4, Vol. 569, Nos. 1-3*).

Producing pentaerythritol, comprising reacting solution of acetaldehyde and formaldehyde, containing a neutral salt, in presence of an anion exchange agent. No. 2,364,925. Harold Spurlin to Hercules Powder Co.

Preparation of hydrogenated glyceridic oil. No. 2,365,045. Casimer Borkowski and Jacob Schille to The Best Foods, Inc.

Conversion of carbon monoxide with hydrogen into hydrocarbons containing more than one carbon atom in molecule which comprises operating in presence of a catalyst prepared by treating compact iron bodies with oxidizing gas. No. 2,365,094. Wilhelm Michael and Adam Buettner.

Making amylaceous acetates, which comprises dispersing amylaceous substance in phosphoric acid and then acetylating. No. 2,365,173. George Caesar to Stein, Hall & Co. Inc.

Production of oxygen-containing organic compounds from olefines, which comprises absorbing ethylene in sulphuric acid, diluting absorption product with water and thereafter absorbing propylene therein. No. 2,365,264. Walter Groombridge and Ronald Page to Celanese Corp. of America.

Producing mono and dibasic acids from fatty substances containing residues of hydroxylated and unsaturated fatty residues, which comprises treating said substances with nitric acid in presence of compound selected from manganous salts, manganic salts, etc. No. 2,365,290. Donald Price and Richard Griffith to National Oil Products Co.

Mixed glycerol ester in which one of acyl groups constitutes a residue of acids in tall oil and one of actyl groups constitutes a residue of fatty acids in an oil selected from animal, vegetable and fish oils. No. 2,365,300. Ernest Segessemann to National Oil Products Co.

Preparing N-monochlorination products of high molecular fatty acid amides, which comprises dispersing high molecular fatty acid amide, in water, introducing a current of chlorine gas into aqueous dispersion. No. 2,365,431. Ludwig Orthner and Theodor Jacobs.

Refrigerants and process of making them, comprising adding a hydrohalide of HCl and HBr to a halogen substituted ethylene containing 1 to 4 halogen atoms of which one is fluorine and others are chlorine, in presence of active carbon. No. 2,365,516. Anthony Benning and Frederick Downing and Roy Plunkett to Kinetic Chemicals, Inc.

Preparation of mercaptans which comprises reacting chlorine, carbon disulfide and compound from saturated acyclic, saturated alicyclic, and aryl substituted saturated aliphatic hydrocarbons in presence of actinic light and pyridine. No. 2,365,561. Morris Kharasch to E. I. du Pont de Nemours & Co.

Manufacture of maleic and fumaric acids. No. 2,365,631. William Faith to Sharples Chemicals, Inc.

Sulphonation of organic compounds which comprises making a sulphonating mixture comprising sulphuric acid, boron trifluoride and an organic compound of the aromatic and heterocyclic series. No. 2,365,638. George Hennion to E. I. du Pont de Nemours & Co.

* *Medicinals*

Therapeutic agent for treatment of rehumatism, gout, etc., comprising a compound selected from phenylcinchoninic acid and its esters, in association with cysteine and an ascorbic acid to lower toxicity of said compound. No. 2,363,541. Gustav Martin and Marvin Thompson to William R. Warner & Co. Inc.

Therapeutic agent for treatment of hypertension. No. 2,363,549. Harold Rabinowitz.

Medicinal white oil composition comprising medicinal white oil, subject to autoxidation, having normally a low induction period and tocopherol sufficient to raise normal induction period of said oil. No. 2,363,722. Jacob Faust and Henry Sonneborn to L. Sonneborn Sons, Inc.

Keratitic medicament composition comprising a water soluble sodium sulphathiazole, a water soluble azosulfamide indicator, and powdered charcoal diluent. No. 2,364,563. John Stribling.

Hog cholera vaccine comprising hog cholera virus associated with hydrous aluminum oxide and an aqueous fluid. No. 2,364,579. Ralph Wyckoff to Lederle Laboratories, Inc.

Treating aqueous extracts containing water-soluble vitamins of the B group to remove constituents which impart objectionable taste to said extracts and which possess an acid-like character, which comprises contacting with absorbing agent comprising a synthetic resin. No. 2,364,639. Ben Maizel to Vico Products Co.

Product effective against ulcers, which is derived from urine of mammals not suffering from a gastric or duodenal ulcer. No. 2,364,760. David Sandweiss to Parke, Davis & Co.

Manufacture of strongly enriched preparation of lactation-promoting hormone of anterior pituitary gland. No. 2,364,852. Karl Junkmann and Rudolf Tschesche to Schering Cor.

Process of isolation of gramicidin. No. 2,365,499. Max Tishler to Merck & Co. Inc.

* *Metals, Alloys*

Making fine grain pig iron. No. 2,363,496. Glenn Beaumont to The Hanna Furnace Corp.

Cyclic process of treating mixed carbonate ores of zinc and magnesium. No. 2,363,572. Niels Christensen.

Production of hard metallic bodies of great and uniform density, which comprises providing a mass of powdered tungsten carbide having requisite particle size. No. 2,363,575. William De Lamatter and Patrick Hume to The American Steel & Wire Co. of N. J.

Preparing ore charge for open hearth furnaces, comprising mixing iron ore, fuel, limestone, and ferrous metal chips, and sintering mixture to form a slag. No. 2,363,666. John Greenawalt.

Process for continuous casting of steel. No. 2,363,695. Herbert Ruppik.

Preparing for cold-working a previously hot-worked hypereutectoid stainless steel containing at least 16% chromium and 0.75% carbon which is hardenable by heat-treatment. No. 2,363,736. John Lynn to Rustless Iron & Steel Corp.

Heat treating a metal article, which includes immersing article in a fusible bath non-oxidizing to the article and capable of wetting surface thereof. No. 2,363,741. Donald Montgomery to The New Britain Machine Co.

Apparatus for coating surface of object with aluminum by thermal evaporation. No. 2,363,781. Lawrence Ferguson to Bell Telephone Laboratories, Inc.

Method of welding. No. 2,363,828. James Anderson to Air Reduction Co. Inc.

Alloy for cutting tools comprising tungsten, molybdenum, cobalt, boron, carbon, and iron, characterized by responsiveness to thermal treatment for precise concurrent development of a predetermined hardness. No. 2,363,947. Anthony de Golyer to Laurence Janney.

Copper plating stainless steel cooking vessels. No. 2,363,973. James

Kennedy, Arthur Knight, and Harold Lee, to Revere Copper & Brass Inc.

Continuous process of and furnace equipment for producing magnesium which consists in removing the carbondioxide from magnesium carbonates. No. 2,364,195. William Austin Darrah.

Making chromium iron alloys. No. 2,364,257. Joseph Vetter to Natural Products Refining Co.

Ore concentrating processes of separating acidic ore materials from other ore constituents which comprises carrying out the concentration operation in presence of substance obtained by heating a polyalkylene polyamine with a substance of group consisting of naphthenic acid, talloel, higher fatty acids and higher fatty acid esters. No. 2,364,272. Ludwig Christmann, David Jayne, Jr. and Stephen Erickson to American Cyanamid Co.

Case carburizing steel which comprises treating steel articles in a molten bath containing alkali metal cyanide and a titanium compound selected from titanium cyanonitride and titanium carbide, remainder of bath being composed of salt from alkali metal carbonates and halides. No. 2,364,292. Donald Holt to E. I. du Pont de Nemours & Co.

Solder for aluminum work pieces consisting of tin, cadmium and silver. No. 2,364,402. Fred Strasser to Alexandre Clavel.

Making a lined bearing which consists in tin plating a cylindrical shell, etc. No. 2,364,503. George Zink to General Motors Corp.

Apparatus for electroplating inside and outside of a tube simultaneously. No. 2,364,564. Randolph Strickland and Harold Zemon to Detroit Aluminum & Brass Corp.

Concentrating finely-divided oxidized-iron ores in which gangue ingredient is quartz, which consists in treating aqueous pulp of ore with an anionic collecting agent selected from higher fatty acids and resin acids and mixtures of fatty and resin acids and soaps thereof, and with cooperating agents consisting of lime and solution of starch. No. 2,364,618. Earl Brown and Francis Tartaron to Minerals Separation North American Corp.

Metallic leaf comprising layer of light gold, layer of light metal, and intermediate layer of dark metal, said layer of gold being contiguous with layer of releasable composition, and layer of sizing on metallic leaf. No. 2,364,674. Donald Swift to M. Swift & Sons, Inc.

Bearing formed by porous body of non-amalgamating material, and mercury in pores of said body. No. 2,364,713. Franz Hensel to P. R. Mallory & Co. Inc.

Pyrometallurgical process for treating tin bearing materials containing sulphur and iron as impurities to recover tin metal. No. 2,364,727. Yurii Lebedeff to American Smelting & Refining Co.

Recovery of metallic magnesium by reducing magnesium oxide. No. 2,364,742. Edmund Merriam to Marietta Manufacturing Co.

Treating tin hardhead to recover tin metal which comprises intermixing with sodium carbonate, coke and sulphur to form a smeltable charge. No. 2,364,815. Carroll Porter to American Smelting & Refining Co.

Heat treating high speed tool steel having a secondary hardness range upon drawing. No. 2,364,893. Frederick Endress to Tuff-Hard Corp.

Method of tinning metal strip. No. 2,364,904. John Keller to The Wean Engineering Co. Inc.

Producing an all-pearlitic cast iron which comprises melting a charge of iron and adding tellurium and calcium-silicide to produce an all-pearlitic structure. No. 2,364,922. Oliver Smalley to Meehanite Metal Corp.

Article having outer shell of gold in solid state and an inner core of metallic particles of inexpensive base metal alloy selected from nickel, copper, cobalt, and beryllium-copper. No. 2,365,083. Tracy Jarrett to American Optical Co.

Conditioning aluminum sheets for welding, first covering surfaces of sheets with solution of hydrofluoric acid until oxide is broken, then covering surfaces with solution of hydrochloric acid until solubles in hydrofluoric acid and remaining oxide are cleaned. No. 2,365,153. Don Stevens to Hammond Aircraft Co.

Removing bismuth from lead or lead alloys which comprises melting metal admixing with metal from alkali and alkaline earth metals, to form a bismuthide, in presence of a flux comprising caustic soda. No. 2,365,177. Joseph Dittmer to National Lead Co.

Means for reducing iron ores and iron compounds. No. 2,365,194. Frank Hodson and Paul Hirsch to American Ore Reduction Corp.

Manufacture of articles from copper base alloy containing over 1% of aluminum wherein the alloy is cast and the cast metal is formed by steps including cold working and annealing. No. 2,365,208. Alan Morris to Bridgeport Brass Co.

Apparatus for the recovery of metals. No. 2,365,346. Osias Kruh.

Production of metallic magnesium, a charge comprising magnesium bearing ore, ferrosilicon and catalyst, said catalyst being one of aluminum oxide, beryllium oxide, etc. No. 2,365,386. Robert Boyer and Elbert Engisn to Ford Motor Co.

Etching polished surfaces of stainless steel and stainless iron by application of noncorrosive flux to avoid blemishing of polished surfaces, the flux selected from zinc chloride, ammonium chloride and aniline phosphate. No. 2,365,539. Leonard Flowers to Westinghouse Electric & Manufacturing Co.

* *Paints, Pigments*

Flatting agent, transparent in conventional lacquer and varnish films, which comprises pigment size particles of a soap of metal of aluminum, zinc, magnesium, and alkaline earth metals, and rosin coated with water soluble colloidal organic film forming agent. No. 2,363,489. Laszlo Auer to Interchemical Corp.

Manufacturing camouflage which comprises mixing paint and loose fibrous material in a container and passing netting through the mixture. No. 2,364,289. St. Clair Hale to Parker-Wolverine Co.

Flatting agent which is transparent in lacquer and varnish films, which comprises pigment size particles of a soap of metal of aluminum, zinc, magnesium and alkaline earth metals, and rosin. No. 2,364,611. Laszol Auer to Interchemical Corp.

Preparation of improved rutile titanium dioxide pigments which comprises calcining anatase titanium dioxide admixed with compound selected from antimony oxides and antimony compounds which yield oxides under calcination. No. 2,365,135. Robert Ancrum to Titan Co. Inc.

Lead chromate pigment production. No. 2,365,171. Edmond Botti to E. I. du Pont de Nemours & Co.

* Continued from last month (*Vol.* 568, *No.* 4, *Vol.* 569, *Nos.* 1-3).

Frangible nickel electroflake pigment. No. 2,365,356. Norman Pilling and Andrew Wesley to The International Nickel Co. Inc.

Lowering bodying tendency of a calcium sulphate pigment which comprises admixing with compound selected from alkaline-reacting and neutral inorganic compounds having appreciable water-solubility. No. 2,365,559. Franklin Kingsbury and Charles Schmidt to National Lead Co.

Lowering paint bodying tendency of a calcium sulphate pigment which comprises admixing with an aliphatic alcoholic amine containing less than eight carbon atoms. No. 2,365,560. Franklin Kingsbury and Frank Schultz to National Lead Co.

* Paper and Pulp

Screening machine for paper pulp. No. 2,364,171. Stephen Staege to The Black-Clawson Co.

Manufacture of bleached kraft pulp. No. 2,364,177. Sidney Wells to The Institute of Paper Chemistry.

Method and apparatus for separating foreign matter from papermaking material. No. 2,364,405. Edward Trimbey and George Walker; said Walker to said Trimbey.

Making coated paper which comprises applying aqueous coating composition containing casein and pigment to paper and allowing casein to react with formaldehyde. No. 2,364,505. Eugene Bennett to The Champion Paper & Fibre Co.

Separating sylvite from a pulp which comprises subjecting pulp to concentrating process employing a collector selected from aliphatic amines. No. 2,364,520. Allen Cole and Wesley Houston to Minerals Separation North American Corp.

* Petroleum, Refinery

Making a precipitated catalyst for use in catalytic treatment of hydrocarbons and formed of chromium and aluminum oxides. No. 2,363,-498. Robert Burk and Everett Hughes to The Standard Oil Co.

Breaking petroleum emulsions of water-in-oil type, characterized by subjecting emulsion to demulsifying agent comprising compound consisting of salt of an amido pyridinium base. No. 2,363,504. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Breaking petroleum emulsions of water-in-oil type, charactrized by subjecting emulsion to demulsifying agent containing salt of an amido pyridinium base. No. 2,363,505. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Breaking petroleum emulsions of water-in-oil type, characterized by subjecting emulsion to action of an ester. No. 2,363,506. Melvin De Groote, Bernhard Keiser and Arthur Wirtel to Petrolite Corp. Ltd.

Vapor phase cracking process. No. 2,363,532. William Keeling.

Catalyst chamber having a vertical cylindrical side wall. No. 2,363,623. Wendell Roach and Roy Vinyard to Phillips Petroleum Co.

Catalytic conversion of hydrocarbons in which catalyst is deactivated by deposition of carbon thereon and reactivated by contact with oxygen-containing gas in a regeneration zone. No. 2,363,716. I. Louis Wolk to Phillips Petroleum Co.

Catalytic reactor. No. 2,363,738. Percy Mather and Lev Mekler to Universal Oil Products Co.

Process and apparatus for treating fluids and catalyst in reaction zone. No. 2,363,874. Robert Krebs to Standard Oil Development Co.

Cracking relatively heavy hydrocarbon liquids to produce lower boiling hydrocarbons including olefins and aromatic gasoline constituents. No. 2,363,903. Brook Smith to Standard Oil Development Co.

Hydrocarbon conversion. No. 2,363,911. Charles Thomas to Universal Oil Products Co.

Cracking of heavy hydrocarbon oils for production of lighter hydrocarbon oils therefrom by distillation under pressure. No. 2,363,963. Eugene Herthel to Sinclair Refining Co.

Isomerizing paraffin and cycloparaffin hydrocarbons which comprises contacting with a non-gaseous metal halide isomerizing catalyst in combination with supporting material comprising finely divided carbon black. No. 2,364,106. Ernest Solomon, Herbert Passino and Louis Rubin to The M. W. Kellogg Co.

Solid catalyst for conversion of hydrocarbons which is free of sodium and potassium and comprises in combination silica, alumina, aluminum fluoride and a magnesium compound selected from magnesia and magnesium fluoride. No. 2,364,114. Preston Veltman to The Texas Co.

Catalytic treatment of a gas or vapor which comprises passing gas at a velocity greater than velocity of sound in said gas in contact with a finely powdered catalyst which has become agglomerated and thereby breaking agglomerates of said catalyst to produce subdivided catalyst particles of original fineness. No. 2,364,145. Walter Huppke and Theodore Vermeulen to Union Oil Co. of California.

Controlling deposition of wax in a conduit in which a crude petroleum oil having a tendency to deposit wax **is flowing,** which comprises continuously injecting a small amount of a wax crystal modifier into the oil. No. 2,364,222. David Kaufman to Texaco Development Corp.

Removing mercaptan sulphur from petroleum distillate which consists in contacting vapor with calcium oxide and calcium hydroxide. No. 2,364,390. Jan Schaafsma to Socony-Vacuum Oil Co. Inc.

Alkylation process employing hydrogen which comprises subjecting a gaseous mixture consisting of gaseous paraffin hydrocarbon and gaseous olefin hydrocarbon and molecular hydrogen to action of a solid dehydrogenating catalyst. No. 2,364,430. Carleton Ellis to Standard Oil Development Co.

Preparation of mono-alkyl sulfates for subsequent alkylation with isoparaffins comprising contacting olefins with concentrated sulfuric acid. No. 2,364,451. Henry Kohler to Standard Oil Development Co.

Hydrocarbon fuel distillate stabilized by base metal salt of a resinous ammonium condensation product of an alkyl phenolformaldehyde-hydrogen halide condensation product. No. 2,364,502. John Zimmer and Jones Wasson to Standard Oil Development Co.

Solvent-extracting gasolines. No. 2,364,517. Robert Burk to The Standard Oil Co.

Extracting weak acids associated with hydrocarbons from gasolines containing them and free from acid-sulfuric acid derivatives with an aqueous alkaline solution. No. 2,364,582. Orris Davis and Alan Nixon to Shell Development Co.

Hydrocarbon isomerization process where plurality of elongated beds of catalyst comprising anhydrous aluminum chloride and an adsorptive alumina are used to carry out simultaneously and alternately hydrocarbon isomerization and catalyst regeneration. No. 2,364,583. Martin de Simo and Harry Cheney to Shell Development Co.

Method of and apparatus for recovering desirable petroleum hydrocarbon fractions from high pressure wells. No. 2,364,660. Laurance Reid.

Treatment of hydrocarbons. No. 2,364,739. William Mattox and Wayne Benedict to Universal Oil Products Co.

Leaded gasoline containing a compound selected from chloro and chlorobromo alkanes to reduce deposit of lead compounds formed on combustion of gasoline. No. 2,364,921. Edward Shokal to Shell Development Co.

Cracking hydrocarbon oils which comprises passing oil in vapor form through a cracking zone containing a catalyst consisting of silica and zirconia. No. 2,364,949. Gerald Connolly to Standard Oil Development Co.

Motor fuel combining quick-starting and low vapor locking tendency for use in high-compression spark-ignition engines. No. 2,365,009. Anthony Robertson to Standard Oil Development Co.

Catalytic destructive hydrogenation of hyprocarbon oils in presence of hydrogen and carbon monoxide which comprises contacting hydrocarbon oil with a metallic iron group catalyst. No. 2,365,029. Alexis Voorhies, Jr. to Standard Catalytic Co.

Preparing an improved injection engine fuel containing chemically combined reactive oxygen, comprising subjecting petroleum distillate injection engine fuel free from asphaltic and resinous materials, and aromatic ring compounds to treatment in liquid phase with an oxygen-containing gas. No. 2,365,220. Thomas Schultz and Irving Levine and Homer Wellman to Standard Oil Co. of California.

Motor fuel comprising hydrocarbons boiling within gasoline boiling range, a metal carbonyl compound to raise anti-knock rating and a phosphatide. No. 2,365,377. Richmond Bell to The Pure Oil Co.

Pyrolytic dehydrogenation of liquid petroleum hydrocarbons. No. 2,365,413. Herman Kipper.

Producing isoparaffins boiling in motor fuel range from a C_4 mixture containing normal butane, isobutane, and normal butenes. No. 2,365,-426. Lawrence Molique to Phillips Petroleum Co.

Conversion of sulphur-containing hydrocarbon charge stocks in presence of a solid adsorptive catalytic contact mass material alternately utilized in reaction and subjected to an oxidation regeneration. No. 2,365,-630. Frank Fahnestock to Socony-Vacuum Oil Co. Inc.

Treating with sulphonating agent a viscous petroleum oil characterized by incomplete or slow separation of sulphonated material as acid jelly upon addition of water to oil. No. 2,365,653. Pharez Waldo and Paul Goodloe and Henry Berger to Socony-Vacuum Oil Co. Inc.

* Photographic Chemical

Developing photographic element containing a reducible silver salt image in presence of an organic amide. No. 2,363,493. Walter Baldsiefen to E. I. du Pont de Nemours & Co.

Making corrected print from a color-separation record of a scene on one film. No. 2,363,689. Gerald Rackett to Technicolor Motion Picture Corp.

Stripping photographic element comprising a base having superposed thereon at least two coacting layers, one of which is light sensitive and other of which is light insensitive and cold-water insoluble. No. 2,363,764. Clayton White to E. I. du Pont de Nemours & Co.

Production of blue-black toned silver images which comprises developing photographic element containing reducible silver salt image in presence of a methylol nitromethane. No. 2,364,017. Walter Baldsiefen to E. I. du Pont de Nemours & Co.

Treating photographic paper for preventing counterfeiting thereof, consisting of immersing in a coloring bath comprising a solution of phenosafanine. No. 2,364,337. Antonio Campana Bandranas.

Discharging color from dye-containing photographic film scrap which comprises treating scrap with ozone in an aqueous bath. No. 2,364,-343. Hans Clarke and Joseph Stampfli to Eastman Kodak Co.

Photographic developer which contains, as an essential ingredient, an amino compound. No. 2,364,350. Joseph Dickey and James McNally to Eastman Kodak Co.

Preventing diffusion in photographic gelatin-silver halide layers, of color couplers which couple with oxidation product of primary aromatic amino color developers, which comprises mixing color coupler with gelatin and a water-insoluble salt of a resin. No. 2,364,374. Edward Knott to Eastman Kodak Co.

Producing a natural-color photographic print of normal contrast and satisfactory color rendition. No. 2,364,379. Leopold Mannes and Leopold Godowsky, Jr. to Eastman Kodak Co.

Photographic color forming compounds containing sulphonamide groups. No. 2,364,675. Paul Vittum, Willard Peterson, and Henry Porter to Eastman Kodak Co.

Sensitizer comprising a gel-forming colloidal clay and light-sensitive chemicals selected from (1) blueprint sensitizers, (2) diazo sensitizers and (3) direct line iron sensitizers. No. 22,579. Clyde Crowley and John Mullen to The Huey Co.

Color forming photographic developer. No. 2,365,206. Emery Meschter to E. I. du Pont de Nemours & Co.

Compensating for non-linear density characteristic curve of photographic film. No. 2,365,376. Carlheinz Becker.

Light-sensitive photographic material in form of a layer of a film-forming linear superpolyamide which is insoluble in water, shrink-resistant and capable of being charged with substance sensitive to light. No. 2,365,416. Walther Kuhne.

* Resins, Plastics

Imitation mother-of-pearl comprising plastic base material, selected from cellulose acetate, casein and phenol formaldehyde and urea formaldehyde resin, having incorporated therein particles of an ammonium phosphate salt of a metal selected from magnesium, manganese and zinc. No. 2,363,570. Amerigo Caprio to Celanese Corp. of America.

Cold drawing polyester. No. 2,363,581. Carl Frosch to Bell Telephone Laboratories, Inc.

Aldehyde copolymer. No. 2,363,616. Joseph Patrick to Thiokol Corp.

Furfuraldehyde-ketone-formaldehyde reaction product and method of making same. No. 2,363,829. Solomon Caplan and Mortimer Harvey to Harvel Research Corp.

Plasticizing synthetic inorganic gelatinous materials to form a plastic product suitable for molding. No. 2,363,832. Gerald Connolly to Standard Oil Development Co.

Preparation of heat-convertible, soluble fusible polymers of divinyl benzene. No. 2,363,836. Gaetano D'Alelio to General Electric Co.

Synthetic resinous mass being a condensation product of a phenol and an aldehyde and containing as modifying agent one of formaldehyde-soluble acetates of gelatin, abieto acetates of gelatin and boro-abieto acetates of gelatin. **No. 2,363,893. Jean Baptiste Monier.**

* Continued from last month (*Vol. 568, No. 4, Vol. 569, Nos. 1-3*).

Continuously polymerizing in aqueous emulsion organic monomeric polymerizable compounds lighter than water and yielding a dispersion of polymerizates heavier than water. No. 2,363,951. Hans Fikentscher to General Aniline & Film Corp.

Decorative article characterized by an opalescent appearance consisting in polystyrene and a cellulose ether. No. 2,364,024. Ralph Hayes to Monsanto Chemical Co.

Resinous composition comprising a vinyl aromatic resin which normally becomes discolored upon aging and a stabilizing agent therefor comprising a compound selected from aromatic hydrocarbon compounds. No. 2,364,027. Alfred Marshall to Monsanto Chemical Co.

Condensation product consisting of cyclized rubber reacted with maleic anhydride. No. 2,364,089. James Mitchell to E. I. du Pont de Nemours & Co.

Purifying crude fossil resins of type found in Utah coal, which resins are contaminated with asphalts and waxes. No. 2,364,090. Adriaan Nagelvoort.

Recovering resins from coal in which the resin exists as discrete inclusions. No. 2,364,091. Adriaan Nagelvoort.

Condensation product consisting of phenol-rubber product reacted with maleic anhydride. No. 2,364,158. James Mitchell to E. I. du Pont de Nemours & Co.

Manufacture of improved phenolic varnish resins which comprises heating a di-o methylol derivative of a p-alkyl-substituted monohydric phenol with an aliphatic aldehyde. No. 2,364,192. William Charlton, Jack Harrison and Roy Waters to Imperial Chemical Industries Ltd.

Heat-oxygen treated polyamides. No. 2,364,204. Calvin Fuller to Bell Telephone Laboratories, Inc.

Polymerising vinyl chloride in form of an aqueous emulsion in presence of a dispersing agent having solubility in water selected from salts of pure sulphonic acids of sulphuric acid esters of organic compounds. No. 2,364,227. John Lewis, Leslie Morgan and John Watts to Imperial Chemical Industries Ltd.

Plain-weave open mesh window screen consisting of intersecting warp and weft monofils of a synthetic linear polyamide condensation product. No. 2,364,404. Harry Thomas.

Chlorinated polythene containing from 0.1 to 5.0% of sodium lactate. No. 2,364,410. Donald Whittaker to Imperial Chemical Industries Ltd.

Apparatus for forming films by extrusion of molten polymer. No. 2,364,435. Henry Foster and Arthur Larchar to E. I. du Pont de Nemours & Co.

Insulating wire for use as an electrical conductor, comprising lapping wire with fine artificial filaments consisting of a thermoplastic material having electrically insulating properties, applying to lapped wire a liquid softening agent. No. 2,364,702. Donald Finlayson, Ernest Greenwood and William Simpson to British Celanese Ltd.

Molded heel the body portion of which consists of a cured resin and fibrous material. No. 2,364,744. Thomas Morris to B. B. Chemical Co.

Subresinous acylated polyamine. No. 2,364,779. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Promoting polymerization of unpolymerized and monomeric organic materials of high dielectric value which comprises dispersing titanium dioxide in said material and exposing it to an energized electrostatic high frequency field. No. 2,364,790. Charles Hemming to E. I. du Pont de Nemours & Co.

Rubber cement including a dispersing medium having dispersed therein a hard abrasive mineral filler, the filler being one of calcium carbonate, calcium silicate and hydrated aluminum oxide and a tough thermoplastic resin-like reaction product of crude rubber and a phenol. No. 2,364,847. Glen Hiers to Collins & Aikman Corp.

Water-soluble formaldehyde-hardenable nitrogenous body selected from melamine and partial condensation products of melamine with formaldehyde and, as a hardener, a water-soluble acetone resin. No. 2,364,900. Frederick Hessel and John Rust to Ellis-Foster Co.

Insulated electrical conductor comprising metallic conductor, insulating wall of glass fibres, said fibres being impregnated with a heat-set soya bean oil, a glass braid over insulation wall and a baked, heat-stable synthetic resin coating on braid. No. 2,365,019. Howard Stewart to General Electric Co.

Gummed sheet material of water-remoistenable type comprising a backing and on one side of backing an exposed dry coating of water-activatable adhesive in continuous phase and a deformable resinoid filler in discontinuous phase. No. 2,365,020. Charles Stillwell to Dennison Manufacturing Co.

Accelerating the polymerization of haloprenes. No. 2,365,035. Mortimer Youker to E. I. du Pont de Nemours & Co.

Refining of phenolic resins Zn-NaHSO$_4$ mixture. No. 2,365,121. William Traylor to Hercules Powder Co.

Refining a modified alkyd resin which comprises treating said alkyd resin dissolved in solvent with nascent hydrogen. No. 2,365,122. William Traylor to Hercules Powder Co.

Refining a coumarone-indene resin which comprises treating said resin with metal above hydrogen in electromotive series and acid salt of a polybasic inorganic acid selected from sulfuric acid and phosphoric acid. No. 2,365,123. William Taylor to Hercules Powder Co.

Treating cellulose acetate to remove combined acid sulfate radicals therefrom. No. 2,365,258. Bruce Farquhar and Ferdinand Schulze to E. I. du Pont de Nemours & Co.

Method of an apparatus for producing continuous organic plastic sheets or ribbons by extrusion. No. 2,365,326. James Bailey to Plax Corp.

Molded pulp article of dish shape, consisting of porous compressible mass of fibers die-molded from aqueous suspension of fibers and discrete particles of uncured plastic material curable by heat. No. 2,365,331. William Carter to Brayton Morton, as trustee.

Cleaving a polymer of an N-vinyl imide of an organic dicarboxylic acid which comprises maintaining in contact with an active hydrogen containing hydrolytic agent of aqueous solutions of basic metal hydroxides, quaternary ammonium hydroxides, etc. No. 2,365,340. William Hanford and Halsey Stevenson to E. I. du Pont de Nemours & Co.

Shaping solvent-free organic plastic material by extrusion through a die of substantial length. No. 2,365,374. James Bailey to Plax Corp.

Shaping organic plastic material by placing material in a stuffer and then forcing material through stuffer into and through a die. No. 2,365,375. James Bailey and Raymond Jesionowski to Plax Corp.

Halogen-containing high-polymeric substances selected from chloro-rubber, chlorinated butadiene rubber, polyvinyl chloride, chlorinated polyvinyl chloride, and polyas-dichlor ethylene; containing sodium carbonate and member of diphenyl-, dinaphthyl-, ditolyl- and dichlordiphenyl-thiourea. No. 2,365,400. Hans Fikentscher.

Plastic composition resistant to loss of plasticity which comprises an anhydroformaldehyde-arylamine and plastic polymerisates obtained by subjecting polymeric butadiene-1:3-hydrocarbons with styrene, to an oxidizing treatment. No. 2,365,405. Erich Gartner and Albert Koch.

Cold-molding composition comprising a filler and a binder, said binder comprising a resinous pitchy material and a resin having a higher melting point and incompatible with said resinous pitchy material. No. 2,365,491. Paul Powers to Armstrong Cork Co.

Polymerizing a chlorine-substituted ethylene in which chlorine is attached to one of carbon atoms in an aqueous emulsion with a peroxygen catalyst, which comprises carrying out reaction in presence of a water-soluble lead salt of a saturated fatty acid. No. 2,365,506. Claude Alexander and Frank Schoenfeld to The B. F. Goodrich Co.

Finely divided cork bonded with thermoplastic bonding material. No. 2,365,508. Paul Austin to E. I. du Pont de Nemours & Co.

Production of rigid domes from organic, synthetic, thermoplastic material in rigid sheet form. No. 2,365,637. Edward Helwig to Rohm & Haas Co.

Electric insulating fibrous tape impregnated with mixture of polymerized aromatic vinyl hydrocarbon and a monomeric polymerizable aromatic hydrocarbon. No. 2,365,646. Archibald New, Stanley Foord and Dudley Beckwith to International Standard Electric Corp.

* Rubber

The 2,4-dinitrophenyl ester of 2-mercaptothiazoline used in vulcanization of rubber. No. 2,363,598. Paul Jones and Roger Mathes to The B. F. Goodrich Co.

Polysulphide copolymers. No. 2,363,614. Joseph Patrick to Thiokol Corp.

Polysulphide copolymer. No. 2,363,615. Joseph Patrick to Thiokol Corp.

Butadiene polymer composition comprising a copolymer of butadiene with a substance selected from acrylic nitrile and styrene, incorporated with a plasticizer selected from polyglycol halides and polyglycol esters of lower fatty acids. No. 2,363,617. Joseph Patrick to Thiokol Corp.

Butadiene polymer composition comprising a lower fatty acid ester of a polythioglycol incorporated with a copolymer of butadiene and a substance selected from acrylic nitrile and styrene. No. 2,363,618. Joseph Patrick to Thiokol Corp.

Hard boardy theromplastic, the conversion product of a mix composed of vulcanizable rubber, a curing agent to cure said rubber to condition ranging from soft vulcanized to semi-hard vulcanized state, and a hard highly purified resinous rubber isomer obtained from heating rubber in excess of a phenol. No. 2,363,654. Lawrence Daly to United States Rubber Co.

Antioxidants, a 5,8-dihydro dihydroxy naphthalene in which dihydroxy groups are chosen for placement from the 1,2 and the 1,4 positions in naphthalene nucleus. No. 2,363,687. Philip Paul to United States Rubber Co.

Rubbery material composed of a low temperature interpolymer of isobutylene with a conjugated diolefin, together with a filler of carbon black, sulfur, a sulfurization aid, zinc oxide and stearic acid. No. 2,363,703. William Sparks and Robert Thomas to Jasco, Inc.

Preventing oxidation of rubber by inflation which comprises inflating article with air and injecting a slug of a volatile oxidation inhibitor into article. No. 2,363,717. I. Louis Wolk to Phillips Petroleum Co.

Reclaiming scrap containing vulcanized polychloroprene which comprises heating in a subdivided condition in presence of a di (hydroxyaryl) sulphide. No. 2,363,873. Walter Kirby and Leo Steinle to United States Rubber Co.

Improving adhesion of rubber to fibrous materials and product thereof. No. 2,363,981. Edward Lessig and Edward Cunningham to The B. F. Goodrich Co.

Manufacturing rubber-like thermoplastic products of high molecular weight which comprises reacting a protein, monochloracetic acid and ammonium-sulfocyanide and a phenol at 100° C., adding then an aldehyde. No. 2,364,034. Oskar Huppert.

To form a vulcanizable rubber product, with natural rubber, an organic accelerator containing no free amino groups, and alkylene polyamine. No. 2,364,052. Frederick Bersworth and Morris Omansky to The Martin Dennis Co.

Curing tread rubber on tires. No. 2,364,167. Harry Scott to Super Mold Corp. of California.

Making rubber-amine reaction products which comprises boiling together natural rubber and an organic amine having in each molecule one amino nitrogen atom. No. 2,364,186. Frederick Bersworth to The Martin Dennis Co.

Preserving a rubber which comprises treating a rubber with a sulfide of a monohydric dialkyl phenol. No. 2,364,338. David Beaver to Monsanto Chemical Co.

Synthetic rubber-like product derived by treatment with a chloride of sulphur of a polymerized isobutylene having molecular weight above 1,000. No. 2,364,382. Arnold Morway to Jasco, Inc.

Composition comprising rubber and as softener and plasticizer thereof a heat reaction product of a rubber and an aryl phosphine halide and an aromatic condensed polynuclear compound. No. 2,364,394. Robert Sibley to Monsanto Chemical Co.

Producting a rubber-reinforcing cord having an improved flexing life. No. 2,364,467. Ralph Nickerson to National Cotton Council of America.

Golf ball comprising spherical body made of a rubber characterized by high mechanical hysteresis loss under impact; and filler material consisting of magnesium oxide. No. 2,364,955. William Diddel.

Vulcanized hard rubber panel, devoid of cold flow, and capable of being bent without cracking upon being warmed, containing rubber, lime, accelerator, cured phenolic resin powder, hard rubber dust and sulphur. No. 2,365,335. Edward Dillehay to The Richardson Co.

* Textiles

Forming fiber blanket which comprises depositing individualized vegetable fibers carrying liquid to render fibers adhesive into thick pile in form of mat. No. 2,363,480. Robert Brownlee to Wood Conversion Co.

Translucent fiber tissue pressure-sensitive adhesive tape. No. 2,364,001. Gustave Schieman to International Plastic Corp.

Sewing thread comprising a balanced cabled assembly and consisting of cellulose acetate or other cellulose ester filamentous threads that have been stretched and saponified. No. 2,364,135. Donald Finlayson to Celanese Corp. of America.

Making enzyme thinned starch size. No. 2,364,590. Herman Schopmeyer and Herbert Kaufmann to American Maize-Products Co.

Textile printing emulsions. No. 2,364,692. Norman Cassel to Interchemical Corp

Textile decorating composition yielding improved pigment color value on fabric, comprising a pigment dispersed in an aqueous polyvinyl alcohol solution and a water-soluble alginate, whereby color value is improved.

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* Continued from last month (*Vol.* 568, *No.* 4, *Vol.* 569, *Nos.* 1-3).

No. 2,364,738. Carl Marberg and Earl Fischer to Interchemical Corp.

Apparatus for chemically treating continuous web of fabric. No. 2,364,838. Sumner Williams.

Preparing a dry resin size which comprises heating a mixture of a resin and aqueous sodium hydroxide. No. 2,364,965. Edmund Georgi to Hercules Powder Co.

Making lace fabric and like which comprises stitching fabric on support consisting of polyvinyl alcohol film which contains a plasticizing medium. No. 2,365,315. Thomas Williams to E. I. du Pont de Nemours & Co.

Processing textile warp yarns comprising treating said yarns with a col-loidal solution of a phosphate size, treating said goods with water containing calcium and magnesuim hardness, whereby hardness is rendered innocuous by reaction with said size. No. 2,365,402. Robert Foster to Monsanto Chemical Co.

* *Water Sewage and Sanitation*

Detecting physiologically-toxic gases, vapors, mists, and like contaminat-ing an atmosphere, by means of a catalyst capable of being deactivated by said contaminations. No. 2,363,478. Jan Boeke.

Method of and apparatus for treating boiler water. No. 2,363,622. Cyrus Rice.

Sewage clarification apparatus. No. 2,364,023. Walter Green to Infilco, Inc.

Sewage treatment. No. 2,364,298. Ewald Kamp to Graver Tank & Mfg. Co. Inc.

Analyzing sample of formation water for presence therein of extremely small quantities of hydrocarbons. No. 2,364,898. Gerald Hassler to Shell Development Co.

Agricultural Chemicals

Residue obtained by distilling cottonseed oil. No. 2,366,526. William Schaufelberger and Mortimer Harvey to Harvel Research Corp.

Residue obtained by distilling soya-bean oil. No. 2,366,525. Mortimer Harvey and William Schaufelberger to Harvel Research Corp.

Insecticidal and fungicidal composition comprising compound selected from diaryl-guanidine and aryl-biguanide salts of dinitro-phenals in mixture with carrier. No. 2,367,534. Frank Smith and John Hansen to The Dow Chemical Co.

Cellulose

Colouration of cellulose ester or ether fibrous textile materials, by forming therein a lake of a mordant dye from dye and a salt of a mordant metal, wherein dye and mordant metal salt are incorporated in material by impregnating latter with solution of dye and mordant metal salt in liquid medium which is a swelling agent for the material. No. 2,365,809. George Ellis and Alexander Wesson to Celanese Corp. of America.

Lignocellulosic article comprising applying a mixture of urea formalde-hyde glue with a catalyst and asbestos to a surface of alignocellulosic substance. No. 2,366,025. Horace W. Hall.

Adsorption type filter cartridge comprising adsorbent cellulose fibers adsorbently maintained, said fibers being impregnated with a surface active compound of class consisting of lauryl amide of ethyl phosphoric acid, stearyl amide of ethyl phosphoric acid, etc. No. 2,366,190. James Hurn to The De Luxe Products Corp.

Coloration of materials having basis of an organic ester of cellulose with water-insoluble dyestuffs, increasing affinity of dyestuffs for said materials and improving resistance to acid fading by subjecting materials to action of solution of an alkali metal hydroxide. No. 2,366,241. Camille Dreyfus.

Bleaching cellulosic goods containing portions dyed with naphthol dye which comprises heating goods dampened with alkaline peroxide bleaching solution. No. 2,366,740. Robert McEwen to Buffalo Electro-Chemical Co. Inc.

Preparing cellulosic plastics which comprises dispersing a ligno-cellulosic material in hydrocarbon bath inert with respect to said material, adding to dispersion urea, a mixture of acetic and sulphuric acids, and lignin resin. No. 2,366,781. Bruce Geller.

Manufacture of cellulose nitrates in which cellulose is nitrated and then centrifuged, which comprises sousing cellulose nitrate, after centrifuging, in a liquid consisting of mixture of nitric and sulfuric acids. No. 2,367,533. William Sillick to Eastman Kodak Co.

Ceramics

Tempering glass sheets or plates which consists in chilling the sheet differentially whereby predetermined zones of different temper are established in the sheet. No. 2,365,967. Bernard Long to The American Securit Co.

Forming pebble like nodules of glass batch materials comprising ordinary glass batch sand and soluble fluxes, which process comprises incorporating with glass batch materials a finely powdered insoluble material. No. 2,366,473. George Bair to Norbert Garbisch.

Producing on object a thin hardened layer of material capable of reduc-ing surface reflection and strongly resistant to chemical and mechanical attacks, comprising applying to object an aqueous dispersion of a gel-like low of hydrated silicon dioxide. No. 2,366,516. Walter Geffcken and Edwin Berger.

Polishing surface of a body of lime-soda glass, which comprises subjecting it to frictional action with suspension of rouge in dilute halogen acid from hydrochloric acid and hydrofluoric acid. No. 2,366,825. Frederick Adams to Pittsburgh Plate Glass Co.

Manufacture of porous insulation from a ceramic body having embedded therein combustible material which is burned out of body in formation thereof. No. 2,367,093. Henry Brown, Jr. and Boyd Abbott to Armstrong Cork Co.

Chemical Specialties

Producing insect and mildewproofed fiber board having distributed therethrough on fibers thereof a polychlorophenol selected from trichlorphenol, tetrachlorphenol and pentachlorphenol. No. 2,365,833. Henry Morrill and John Fleming to Monsanto Chemical Co.

Breaking water-in-oil emulsions which comprises mixing with reagent containing sulfonated and neutralized tall oil and compound selected from aromatic amines, pyridine, quinoline and their substitution products and a compound selected from polyhydroxy alkyl compounds and their halogen-substituted products. No. 2,365,852. Meyer Agruss and Hans Schindler to The Pure Oil Co.

* Continued from last month (*Vol. 568, No. 4, Vol. 569, Nos. 1-3*).

Reagent for breaking water-in-oil emulsions comprising alkali salt of sulfonated tall oil and alkali salt of mahogany sulfonic acid. No. 2,365,853. Meyer Agruss and Hans Schindler to The Pure Oil Co.

Condensation product whose aqueous solutions possess a strong wetting and softening power, and is decomposed by boiling with hydrochloric acid. No. 2,365,871. Charles Graenacher and Richard Sallmann to Society of Chemical Industry in Basle.

Adhesive composition comprising bentonite, rubber latex, magnesium chloride, water-soluble soap and preservative. No. 2,365,873. John Harris.

Preparing emulsifying agent, which comprises reacting litharge with esters of lanolin to form lead soaps of ester fatty acids and to liberate sterols, and subjecting resulting mixture, to reaction with hydrogen to convert said fatty acids to corresponding alcohols. No. 2,365,915. James Taylor to The Procter & Gamble Co.

Treating liquid media to remove cations therefrom which comprises con-tacting such media with a water-insoluble sulphonated polymerizate of a mixture comprising a poly-vinyl aryl compound and a monovinyl aryl compound. No. 2,366,007. Gaetano D'Alelio to General Electric Co.

Treating liquid media to remove anions therefrom which comprises con-tacting such media with a water-insoluble aminated polymerizate of a mixture comprising a polyvinyl aryl compound and a mono-vinyl aryl compound. No. 2,366,008. Gaetano D'Alelio to General Electric Co.

Detergent and wetting compositions comprising a water-immiscible alcohol, a water-miscible alcohol, and a water-soluble saturated hydrocarbon sulfonate from sulfonic acids and water-soluble salts thereof, being residue left after extraction in the liquid phase of aqueous mass obtained by hydrolysis of a crude reaction mass comprising sulfonylchloride derivatives of non-aromatic hydrocarbons. No. 2,366,027. Clyde Henke to E. I. du Pont de Nemours & Co.

Producing alkali-acidproof cement of 4 to 100 seconds' viscosity which comprises dissolving polyvinyl butyral in furfuryl alcohol, and then polymerizing furfuryl alcohol by adding an organic acid catalyst to maintain the cement in a workable condition for 39 minutes at room temperature. No. 2,366,049. Claron Payne and Raymond Seymour to The Atlas Mineral Products Co.

Producing a silk screen or like stencil from thin sheet of water-insoluble flexible transparent backing material coated on one side with intermediate film of heat softening material which is semi-transparent, said film having superposed thereon an outer film of gelatin or glue. No. 2,366,083. Ernest Box and Frank Kerridge to Johnson, Matthey & Co. Ltd.

Chewing gum base composition consisting of conventional chewing gum ingredients, and a synthetic cyclic hydrocarbon resin. No. 2,366,086. William Carmody to Carmody Research Laboratories, Inc.

Chewing gum material comprising condensation product of an aliphatic polyamine with polycarboxylic acid obtained by heating unsaturated higher fatty acid and alpha-beta ethylene dicarboxylic acid. No. 2,366,128. Frank Root to Ellis-Foster Co.

Compositions having detergent properties, water soluble salts of alkyl aromatic sulphonic acids. No. 2,366,133. Chester Suter to The Procter & Gamble Co.

Adhesive composition to form highly coherent, tacky, and pressure-sen-sitive coatings comprising a mixture of isoprene resin and rubber. No. 2,366,219. Frank Soday to The United Gas Improvement Co.

Liquid drying composition for finger nail polish comprising olive oil, castor oil and denatured alcohol. No. 2,366,260. Rowena Hickey, one-half to Lorenzo Donarico.

Fluorescent tube coating of undeteriorated phosphor containing entire but invisible carbon residue of a baked and carbonized but unburned carbonaceous binder. No. 2,366,270. Eugene Lemmers to General Electric Co.

Preparation of powdered soap by separating fatty acid soaps of black liquor soap from rosin acids. No. 2,366,334. Alfred Houpt to American Cyanamid Co.

Negative electrode for cadmium nickel storage batteries containing as active mass a powdery substance selected from cadmium oxide and cadmium hydroxide. No. 2,366,402. Anna Hauel.

Antirust composition comprising graphite, glycerin, alcohol, manganese resinate, liquid japan. No. 2,366,486. Rudolph Bruni and John Jones, said Jones to said Bruni.

Glass electrode providing an inner reference surface and outer test surface and having substantially zero asymmetry potential. No. 2,366,489. Henry Carr, Warren Baxter to National Technical Laboratories.

Sub-resinous acidylation derivative of a reactive hydrogen-atom-containing acylated compound. No. 2,366,498. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Method for breaking foam. No. 2,366,513. Louis Gates to The Champion Paper & Fibre Co.

Aqueous solution for impregnating wood or other organic materials, containing difficultly soluble arsenate, CrO_3, and H_3AsO_4. No. 2,366,612. Bror Hager to Bolidens Gruvaktiebolag.

Making an ultra high frequency resistance including subjecting a support member to solution of colloidal graphite in water by dipping it to coat said support member, and then applying solution of platinic chloride in natural oil of lavender, alcohol and a little burgundy pitch. No. 2,366,614. Clarence Hansell to Radio Corp. of America.

Regenerating a bed of hydrogen exchange material in which at least calcium and potassium ions have been collected in exchange for hydrogen ion. No. 2,366,650. Franklin Rawlings and Louis Geofroy to The Dorr Co.

Regenerating an ionic exchanger bed, in which solution containing unspent regenerant chemical remains in bed at end of regeneration phase thereof. No. 2,366,651. Franklin Rawlings to The Dorr Co.

Chewing gum base containing up to 40% of a polyvinyl alkyl ether. No. 2,366,672. Gilbert Mustin to Frank H. Fleer Corp.

Method of preparing gypsum casts. No. 2,366,673. Lewis Paley to United States Gypsum Co.

Non-aqueous brushless shaving preparation in stick-like form to be applied directly to face, formed of mixture comprising vegetable oil and of a waxy substance, and emulsifying agent of glycerol ester type. No. 2,366,759. Richard Thomas and Harry Whitham, deceased, by May Whitham, executrix, to Lever Brothers Co.

Additional patents on chemical specialties, coatings, dyes and stains, equipment, explosives, foods, fine chemicals, industrial chemicals—organic, medicinals, metals and alloys, paints and pigments, paper and pulp, petroleum and refinery, photographic chemicals, resins and plastics, rubber, textiles, and water sewage and sanitation from the above volumes will be given next month.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those interested in obtaining further information concerning the patents reported below should communicate with the Patent Department, CHEMICAL INDUSTRIES. Photostated copies of Canadian patents are available from the Commissioner of Patents, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published Dec. 5, 1944. (Continued)

Dialysing apparatus particularly designed for purification of latex. No. 424,160. Gouvernements Landbouwbedrijven. (Hendrik E. Roeloff Braak)

Treating and fixing an exposed photographic element by immersing the element, including a layer of polyvinyl acetal resin which contains a silver salt, not readily permeable to fixing baths, in a fixing bath containing an inorganic thiocyanate. No. 424,208. Canadian Kodak Co. Ltd. (John I. Crabtree, Geo. T. Eaton)

Removal of opalescence from a photographic element by treatment of element bearing fixed silver image with solution of member of group consisting of ethylenediamine, ethanolamine, triethanolamine, and alcohol. No. 424,209. Canadian Kodak Co. Ltd. (John I. Crabtree, Geo. T. Eaton)

Manufacture of substituted products of phenol, e.g. tertiary butyl phenol, by reacting together isobutylene and phenol in presence of catalyst composition of oxy compound of boron and oxalic acid. No. 424,210. Carbide and Carbon Chemicals Ltd. (Victor H. Turkington, Leo. R. Whiting, Lanning P. Rankin)

Ore concentrator design. No. 424,215. The Consolidated Mining and Smelting Co. of Canada Ltd. (Ronald Sydney Buckman)

Acetylene generator wherein the eflux of acetylene controls carbide input. No. 424,225. Dominion Oxygen Co. Ltd. (Willis G. Schepman)

Manufacture of compact, non-porous rubber sheeting from frothed aqueous dispersion of rubber, by application of the dispersion on a backing, and compacting while wet, and drying. No. 424,226. Dunlop Rubber Co. Ltd. (Evelyn William Madge, Frank Theodore Purkis)

Increasing the electrical surface resistance and flex strength of wet glass fibres by treating with lead acetate solution, and washing. No. 424,228. Fiberglas Canada Ltd. (James Franklin Hyde)

High tension fuse of great interrupting capacities having melting conductor with minimum width only at transverse centre line, with conductor length at least five times greater than minimum width. No. 424,246. Maschinenfabrik Oerlikon (Andreas Gantenbein)

Purification of crystalline alumina contaminated with slag by treating with fused alkali metal cyanide. No. 424,251. Norton Co. (Raymond R. Ridgway)

Pyrotechnic device and method of assembling a choke therein. No. 424,-267. Schermuly Pistol Rocket Apparatus Ltd. (Conrad David Schermuly, Alfred J. Schermuly, Chas. Schermuly)

Paint composition which comprises an emulsion of vegetable oil and water containing magnesium carbonate dissolved therein, in ratio of one part of carbonate to thirty-five parts water, and a pigment, together with method of maufacturing same. No. 424,283. Leslie James Howlett Wesley Henry Howlett, Ronald Henry Warneford)

Apparatus for measuring the water level in steam boilers. No. 424,290. Jean Loumiet et Lavigne.

Granted and Published Dec. 12, 1944.

Mechanical apparatus for the clarification of polluted liquids. No. 424,-293. Anthony J. Fischer, William C. Weber.

Apparatus for filling containers with liquids under partial vacuum. No. 424,304. Hector Murdoch McDonald.

Obtaining liquid products from plants, fruits and vegetables, by distillation of raw plant material under vacuum of the order of 26 inches of mercury, collecting, and condensing vapours. No. 424,305. Harry Alfred Noyes.

Plasticizing polyvinyl chloride by mixing therewith, under application of heat, dibutyl ethylene glycol diphthalate. No. 424,312. American Cyanamid Co. (Edmund R. Meincke)

Manufacture of paper of normal flexibility, handle, and tear resistance, rendered essentially shrinkproof by impregnation with reaction product of 4 to 8 per cent solution of acidified dimethylol urea. No. 424,314. American Reenforced Paper Co. (Francis F. Newkirk)

Fibrous material drawing and drafting machine design. No. 424,317. The British Cotton Industry Research Association (Geoffrey Dakin)

Plastic molding composition for compression and injection molding, comprising 100 parts of cellulose acetate of acetyl value of 55.5 to 56.5 per cent, plasticized solely with from 20 to 50 parts of plasticizer selected from group of dimethyl phthalate, diethyl phthalate, and mixtures thereof with triphenyl phosphate. No. 424,318. Canadian Celanese Ltd. assignee of Celluloid Corp. (Ernst A. Grenquist, R. H. Ball, J. H. Prichard)

Paper-like, flexible sheet material composed essentially of bentonite and mineral fibres, associated with water soluble salt of copper, lead or chromium, so that the bentonite particles agglomerate upon and adhere to the mineral fibres, so that the sheet material so formed is capable of being folded upon itself without breaking. No. 424,321. Canadian General Electric Co. Ltd. (Theodore R. Walters)

Composition comprising the product of polymerization of vinyl dichlorophenoxy acetate and method of manufacturing same. No. 424,329. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Acid curing, thermo setting resin and curing agent therefor. No. 424,330. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Carboy box having an internal vertically extended post secured in each corner. No. 424,367. Dominion Rubber Co. Ltd. (Joseph Walter Nygren)

Fluid viscosity and flow controlling device wherein a pressure relief valve is controlled automatically in sympathy with changes in fluid viscosity. No. 424,368. The Eyre Smelting Co. Ltd. (Cecil Cyprian Higgens)

Process for the manufacture of salts of 2-methyl-4,6-dioxo-5-iodo-tetrahydropyridine-1-acetic acid. No. 424,370. Hoffmann-La Roche Ltd., assignee of F. Hoffmann-La Roche Co. Ltd. (Otto Schnider)

Method of manufacturing di-hydroxyaryl di-alkyl substituted ethylenes. No. 424,388. Parke, Davis & Co. (Frank H. Tendick)

Fluid driven gyroscope. No. 424,396. S. Smith and Sons Ltd. (Frederick Wm. Meredith)

Translucent window-light, composed of translucent textile net base whose meshes are closed with cellulose acetate. No. 424,425. Henry Dreyfus Thomas Clifford Woodman)

Purification of paper pulp, digested straw and like suspensions, wherein the suspension is discharged under pressure from a nozzle on to a surface arranged at an angle to direction of discharge, and having slot in periphery into which heavier particles will pass for segregation. No. 424,426. Samuel Hird Milne, John Innes Melvin.

Amplifying device and circuit for photocathodes. No. 424,429. Siemens & Halske Aktiengesellschaft. (Otto Krenzien)

Granted and Published December 19, 1944.

Electrical apparatus for determining the thickness of a relatively thin layer carried by a magnetizable base. No. 424,432. William Henry Tait.

Process for treating cellulose acetate filament to improve affinity for cellulose acetate dyestuffs and resistance to acid fading comprising controlled sodium hydroxide treatment. No. 424,438. Camille Dreyfus.

Seamless, collapsible tube formed from organic film-forming material. No. 424,439. Camille Dreyfus.

Volatile oil and grease solvent recovery plant design. No. 424,456. Jacques Zucker.

Reaction product of aldehydes and bis-diamino diazinyl cyanoalkylene disulphides. No. 424,478. Canadian General Electric Co. Ltd. (G. F. D'Alelio, James W. Underwood)

Thermosetting resin formed by partial condensation of urea and formaldehyde under alkaline conditions with small amount of a carboalkyoxyarylcarbamyl chloro methane so that said chloro methane intercondenses with the partial condensation product. No. 424,479. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Wood preservation agent containing as an essential active ingredient alkyl mercury pentachlorophenolate. No. 424,484. Canadian Industries Ltd. (A. L. Flenner, P. L. Salzberg)

Process of reacting an inorganic mercuric compound capable of ionizing in acid media with a tetra ethyl lead and pentachlorophenol to form ethyl mercury pentachlorophenolate, useful as a wood preservative. No. 424,485. Canadian Industries Ltd. (A. L. Flenner, P. L. Salzberg)

Method of manufacturing shot gun cartridges. No. 424,486. Canadian Industries Ltd. (Philip Allen Brooks)

Manufacture of filaments of polymeric hexamethylene adipamide by extrusion of molten polymer into a non-solvent quenching liquid maintained at 35° to 45° Cent. No. 424,489. Canadian Industries Ltd. (Johannes Alfthan)

Production of heat-stable vinyl chloride polymer by admixture of a mercaptide of general formula R-S-M where R is unsubstituted aliphatic or aromatic hydrocarbon residue and M is metal selected from group of zinc, mercury, and lead. No. 424,490. Canadian Industries Ltd. (J. R. Lewis, L. B. Morgan, W. McG. Morgan)

Heat-stable polymerized vinyl chloride containing lead or zinc 2:4 dihydroxyquinoline. No. 424,491. Canadian Industries Ltd. (J. R. Lewis, L. B. Morgan, W. McG. Morgan)

Sealing coating composition containing cellulose nitrate, resin, and activated vegetable carbon. No. 424,492. Canadian Industries Ltd. (Robt. T. Hucks)

Water-softening composition comprising tetrasodiumpyrophosphate and disodium hydrogen phosphate, the latter being in such a physical condition as to dissolve more slowly than the former. No. 424,493. Canadian Industries Ltd. (John Kepfer)

Tetrasodium pyrophosphate composition comprising flakes in which the pyrophosphate is distributed in a matrix comprising hydrated trisodium phosphate. No. 424,494. Canadian Industries Ltd. (R. Kepfer)

Continuous process and apparatus for cold drawing polyamide films. No. 424,495. Canadian Industries Ltd. (Guy Baker Taylor)

Water-softening process, involving dissolving soap in the hard water, and thereafter, but prior to the formation of a macroscopic precipitate, adding tetrasodium pyrophosphate. No. 424,496. Canadian Industries Ltd. (Aaron Donald Johnson)

Dispensing container for pulverulent material—such as common salt—with a bellows apparatus incorporated therein to eject contents. No. 424,497. Canadian Industries Ltd. (John Whyte Thomson)

Process for electrodeposition of bright copper from copper cyanide, alkali metal sulphocyanide, and alkali metal cyanide, in stated proportions. No. 424,498. Canadian Industries Ltd. (John Wernlund)

Electric blasting initiator design. No. 424,499. Canadian Industries Ltd. (M. H. English, R. R. Nydegger)

Process for coating surface with solid polythene by spraying or projecting solid polythene through a flame gun onto surface to be coated. No. 424,500. Canadian Industries Ltd. (Colin Falconer Flint, Harold Taylor)

Bag closure designs. No. 424,501 to 424,505 inclusive. Canadian Industries Ltd. (Philip Scott Coghill)

Production of improved linear polyamide filament by water soaking, cold drawing, and treatment with monohydroxy benzene solution under stated conditions. No. 424,506. Canadian Industries Ltd. (Willard Edwin Catlin)

Process for flame-spraying coatings of resins, including polyvinyl butyrals; ethylene polymers; methyl methacrylate polymers. No. 424,507. Canadian Industries Ltd. (M. L. Macht, M. M. Renfrew)

(To be continued)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

410,973. Edward J. Curran, N. Y.; filed Dec. 20, 1943; Serial No. 465,895; for grease to loosen tight joints; since Nov. 15, 1943.
411,311. Clinton Co., Clinton, Iowa; filed Nov. 23, 1942; Serial No. 456,970; for starch sizings; since Sept. 1, 1939.
411,315. Louis A. Priess, Minneapolis, Minn.; filed Oct. 22, 1943; Serial No. 464,355; for dry lubricant; since Sept. 15, 1943.
411,317. Standard Varnish Works, Staten Island, N. Y.; filed Nov. 29, 1943; Serial No. 465,373; for paints; since Nov. 22, 1943.
411,322. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Feb. 29, 1944; Serial No. 467,856; for rust preventative; since January 1936.
411,476. Glitter Products, Inc., Detroit, Mich.; filed Nov. 24, 1943; Serial No. 465,259; for liquid electrical insulation; since Nov. 11, 1943.
463,020. Walter Harks, Fort Wayne, Ind.; filed Aug. 26, 1943; for adhesive pipe sealer; since Aug. 1, 1939.
463,066. The Electro Alloys Co., Elyria, Ohio; filed Aug. 28, 1943; for nickel alloy; since Jan. 1, 1921.
464,005. R-B-H Dispersions, Inc., Bound Brook, N. J.; filed Oct. 8, 1943; for processed drying oil; since June 18, 1943.
464,154. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Oct. 14, 1943; for chemicals; since July 1943.
466,036. Frank W. Dryden & Sons, Baltimore, Md.; filed Dec. 24, 1943; for lubricant; since Oct. 1, 1943.
466,207. United Aircraft Corp., East Hartford, Conn.; filed Dec. 30, 1943; for water-soluble salt for protecting aircraft; since Nov. 11, 1943.
466,454. Mercer Glass Works, Inc., N. Y.; filed Jan. 10, 1944; for chemical ware; since Aug. 5, 1941.
469,635. Interchemical Corp., N. Y.; filed Apr. 25, 1944; for lacquers and paint; since Jan. 27, 1944.
469,805. Corn Products Refining Co., N. Y.; filed Apr. 29, 1944; for corn protein material; since Mar. 10, 1944.
470,022. Daniel O'Neal Furr, Oklahoma City, Okla.; filed May 8, 1944; for thinner for paints; since Apr. 1, 1944.
471,012. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed June 7, 1944; for detergent; since July 27, 1936.
472,037. Harry B. Burt, Tulsa, Okla.; filed July 10, 1944; for stabilizer derived from wheat; since June 4, 1944.
472,502. California Spray-Chemical Corp., Wilmington, Del., and Richmond, Calif.; filed July 22, 1944; for parasiticides; since Sept. 28, 1928.
472,540. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed July 22, 1944; to depress formation of foam; since Apr. 21, 1944.
472,600. Vita-Var Corp., Newark, N. J.; filed July 24, 1944; for adhesive compound; since May 15, 1944.
472,999. Stein, Hall & Co., Inc., N. Y.; filed Aug. 5, 1944; for gum sizing; since June 17, 1944.
473,075. Remington Rand Inc., Buffalo, N. Y.; filed Aug. 8, 1944; for primer for oily surface; since Dec. 27, 1940.
473,136. American Lecithin Co., Cleveland, Ohio, and Elmhurst, Long Island, N. Y.; filed Aug. 10, 1944; for phosphatide product; since Mar. 1, 1944.
473,180. E. I. du Pont de Nemours & Co., Wilmington, Del.; filed Aug. 11, 1944; for ammonium sulfamate compounds as weed killer; since Feb. 17, 1944.
473,331. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Aug. 16, 1944; for lubricants or coolants; since Jan. 11, 1928.
473,362. The Capewell Mfg. Co., Hartford, Conn.; filed Aug. 17, 1944; for asphalt-based paint; since June 30, 1944.
473,513. Simmonds Aerocessories Ltd., Brentford, England; filed Aug. 22, 1944; for liquid level indicators; since Jan. 4, 1944.
473,708. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.; filed Aug. 29, 1944; for chemicals; since 1936.
473,717. American Oil & Supply Co., Newark, N. J.; filed Aug. 30, 1944; for oil and grease; since May 22, 1944.
473,719. American Oil & Supply Co., Newark, N. J.; filed Aug. 30, 1944; for oil and grease; since May 22, 1944.
474,055. Rohm & Haas Co., Philadelphia, Pa.; filed Sept. 9, 1944; for chemicals; since July 1, 1908.
474,104. Universal Zonolite Insulation Co., Chicago, Ill.; filed Sept. 11, 1944; for bituminous waterproof coating; since July 21, 1944.
474,216. The Texas Co., N. Y.; filed Sept. 14,1944; for lubricating oils; since July 1, 1939.
474,220. American Cyanamid & Chemical Corp., N. Y.; filed Sept. 15, 1944; for enzyme compounds; since June 1, 1942.
474,264. Alumatone Corp., Los Angeles, Calif.; filed Sept. 16, 1944; for aluminum paint; since Aug. 1, 1939.
474,387. Westland Oil Co., Minot, N. Dak.; filed Sept. 19, 1944; for liquefied gas; since Aug. 1, 1940.
474,489. Anne Lucas, as Robert M. Lucas Co., Chicago, Ill.; filed Sept. 22, 1944; for paints or cements; since Sept. 1, 1921.
474,502. Oronite Chemical Co., Wilmington, Del., and San Francisco, Calif.; filed Sept. 22, 1944; for cresylic acids; since Apr. 15, 1944.
474,556. Vita-Var Corp., Newark, N. J.; filed Sept. 23, 1944; for lineolates and insecticide; since Aug. 10, 1944.
474,570. Barber Asphalt Corp., Barber, N. J.; filed Sept. 25, 1944; for gasoline; since Aug. 22, 1944.
474,585. Filmite Oil Corp., Milwaukee, Wis.; filed Sept. 25, 1944; for cutting lubricants; since Aug. 31, 1944.
474,670. Kelco Co., San Diego, Calif.; filed Sept. 27, 1944; for algin compound; since 1930.
475,133. Shoe Covers Corp., N. Y.; filed Oct. 9, 1944; for resins; since Dec. 23, 1942.
475,223. Sinclair Refining Co., N. Y.; filed Oct. 11, 1944; for cutting oil; since Aug. 29, 1944.
475,239. Block Drug Co. Inc., Jersey City, N. J.; filed Oct. 12, 1944; for insect repellent; since Oct. 9, 1944.
475,726. Cosmos Dental Products, Inc., N. Y.; filed Oct. 26, 1944; for resin denture materials; since Aug. 18, 1944.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, Dec. 26 to Jan. 16, 1945.

OPE-N-EZE
410,973

CLINTON
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SLIDEASY
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POLYPLASTIC
411,317

FERROCOTE
411,322

KEP-DRY
411,476

BLACK MAGIC
463,020

THERMALLOY
463,066

xLx
464,005

464,154

DRYDENE
466,036

ICELAC
466,207

MERTEX
466,454

WIBLACK
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COPREIN
469,805

PINETINE
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O-S
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Plentose
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FOAMICIDE
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RAYDIZED
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FRIGIDEZE
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MIXTITE
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PACITOR
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WESCO
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